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ABSTRACT

This report describes a program for enhancing critical thinking skills within the high school English and theatre classrooms. The targeted population consists of high school students in two multicultural middle-class suburbs of Chicago. The lack of critical thinking in the classroom was documented through data garnered from teacher observations, questionnaires, surveys, journals, and a modified version of The Cornell Critical Thinking Test Level X. The evidence from research suggests that students display a low participation level, poor decision making, many off task behaviors, anxiety regarding school work, poor ability to transfer knowledge, and tend to give up easily. Although the study analyzes critical thinking within students, it also scrutinizes the level of instruction of critical thinking within the classroom, the level of preparation for teachers on the instruction of critical thinking, and the educational system itself. As a result of the review of literature and the analysis of the problem data, interventions were selected that developed or increased students' abilities to use critical thinking in the English and theatre classrooms. The goal of these interventions was to foster and stimulate critical thinking among students in these classes. Postintervention results indicated that critical thinking is not a process that is easily measured; nor is it a process easily taught. In addition, the use of The Cornell Critical Thinking Test was ineffective and contrary to the critical thinking purpose. There are also many factors out of the control of individual teachers when it comes to implementing and improving critical thinking, thus hindering the effectiveness of critical thinking instruction. Third, critical thinking pedagogy is a learning process for the teachers as well as the students, and it takes time and patience to master. Finally, there is a potential connection between motivation and critical thinking that needs to be considered and addressed in future research. (Contains 27 references, and 2 tables and 22 figures of data.) (Author/RS)

ENHANCING CRITICAL THINKING IN HIGH SCHOOL
ENGLISH AND THEATRE ARTS

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An Action Research Project Submitted to the Graduate Faculty of the
School of Education in Partial Fulfillment of the
Requirements for the Degree of Master of Arts in Teaching and Leadership

Saint Xavier University & IRI/Skylight

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DEDICATION

We would like to dedicate this paper to our husbands, Todd Baker and Billy Delmonico, for their patience, understanding, and support while we worked to complete this paper. We would also like to thank Barb Mulry and Peter Hilton for their extra time, assistance, and encouragement while working through the challenges of graphs and schedules. In addition, we would like to thank Marilyn Lingrel for her keen eye and grammatical savoir-faire. Next, we would like to thank our students, for without them we would not become better learners as well as teachers. Finally, we would like to thank all our friends and family for their constant support and guidance during the past year. We appreciate all everyone has done for us because without their encouragement, assistance and support, this Action Research Project would not have been possible.

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This report describes a program for enhancing critical thinking skills within the high school English and theatre classrooms. The targeted population consists of high school students in two multi-cultural middle-class suburbs of Chicago. The lack of critical thinking in the classroom was documented through data garnered from teacher observations, questionnaires, surveys, journals, and a modified version of The Cornell Critical Thinking Test Level X.

The evidence from research suggests that students display a low participation level, poor decision making, many off task behaviors, anxiety regarding school work, poor ability to transfer knowledge, and tend to give up easily. Although the study analyzes critical thinking within students, it also scrutinizes the level of instruction of critical thinking within the classroom, the level of preparation for teachers on the instruction of critical thinking, and the educational system itself.

As a result of the review of literature and the analysis of the problem data, interventions were selected that developed or increased students' abilities to use critical thinking in the English and theatre classrooms. The goal of these interventions was to foster and stimulate critical thinking among students in these classes.

Post intervention results indicated that critical thinking is not a process that is easily measured; nor is it a process easily taught. In addition, the use of The Cornell Critical Thinking Test was ineffective and contrary to the critical thinking purpose. There are also many factors out of the control of individual teachers when it comes to implementing and improving critical thinking, thus hindering the effectiveness of critical thinking instruction. Third, critical thinking pedagogy is a learning process for the teachers as well as the students, and it takes time and patience to master. Finally, there is a potential connection between motivation and critical thinking that needs to be considered and addressed in future research.

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CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The students of the targeted secondary classes exhibit a lack of critical thinking skills and metacognition that negatively affects their academic growth. As a result, students are not engaging themselves in in-depth questioning, analysis, and evaluation. Evidence for the existence of the problem includes teacher observation, teacher notes, poor journal entries, deficient essay topics and completion, poor test scores, and lack of depth in overall writing and discussion.

Immediate Problem Context

This action research project is being conducted at two sites. For clarification purposes, they are Site A and Site B.

Site A Description

Site A is a high school in a small midwestern town located within a district that encompasses a 26-mile area and serves the needs of more than 13,000 students. There are 13 elementary schools, 4 middle schools, and 2 high schools. Site A has a total enrollment of approximately 2,037 students as stated in the 1996-1997 district summary of the school report card. The student profile is broken into 87.8% White, 6.1% Asian, 3.1% Hispanic, 2.9% Black, and 0.1% Native American. The attendance rate at the aforementioned school is 96.5%. There is a truancy rate of 0.6%, while the dropout rate is 1.0%. This dropout rate is below the state average of 6.4%. The mobility rate within this school is 8.6%. Among the students at Site A, 3.5% come from low-income families, which falls significantly below the state average of 35.7%.

This high school has a parental involvement of 97.8%. The parents are involved in PTA as well as a Strategic Plan Committee. They are also encouraged to serve on special task forces and committees dealing with all areas that concern the school (*(local newspaper)*). Currently, the graduation rate of 97.4% is well above the 81.6% noted as the state average. This district provides a comprehensive special education program that includes inclusion and self-contained classrooms. At the other end of the spectrum, more than 8% of students are enrolled in gifted programs taking accelerated and enrichment courses (*(local newspaper)*).

This district currently has approximately 750 full-time teachers. The teaching staff in the district are 97.3% White, 1.3% Black, 0.7% Hispanic, and 0.7% Asian. Females outnumber males 74.6% to 25.4%. Of the teachers hired within the district, 41.7% hold bachelor's degrees, while 58.3% have master's degrees or higher. The average class size at the high school at Site A is 26.5%. The student to teacher ratio is 20.1:1. In comparison, the student to administrator ratio is 307.7:1. The average teacher salary in this district is \$48,867, while the starting teacher salary is \$28,875. The average administrator salary in the district is \$71,769. The amount spent per year on students is \$5,733.

The students at Site A follow one of three academic tracks: college preparatory, vocational education, or general education. The core program at the school includes 3 years of English, one-half year of speech, and at least 2 years of mathematics, social studies, and science. The district also sends 100 students to the Technology Center of Dupage (TCD), a two year vocational school that costs the district \$3,500 per attending student. Approximately 60% of graduating seniors attend a 4-year university, while 30% attend a 2-year college. The highest Grade Point Average (G.P.A.) in the school is 5.65 on a 5.00 scale; however, the median G.P.A. is a 4.00. Thus, students need to have a 4.08 in order to fall in the top half of their class.

There is a copious selection of extracurricular and co-curricular programs available for students. The following programs are renowned for their award-winning seasons: football, girls' cross-country, boys' golf, boys' track and field, forensics, speech team, scholastic bowl, and marching band. In order to foster diversity and provide an opportunity for all students to participate in an activity, the following programs are also available: athletic training, badminton, baseball, basketball, cheerleading, poms, gymnastics, ice hockey, soccer, softball, swim team, tennis, volleyball, wrestling, intramural basketball, intramural bowling, intramural fitness, percussion ensemble, jazz ensemble, concert band, concert orchestra, symphonic band, chamber orchestra, show choir band, pep band, show choir, chamber choir, vocal jazz, concert choir, chorale, madrigals, color guard, drill team, freedom fighters, radio club, newspaper, peer tutoring, Tigris yearbook, Pride, Namasté, ceramics club, fencing, pep club, Verterra, chess team, key club, math team, student council, tech crew, foreign exchange club, Model UN, computer technology club, youth in government, Students Against Destructive Decisions (SADD), frisbee club, We're In This Together (WITT), Gay/Straight Alliance (GSA), Snowball, skateboard club, National Honor Society, Foreign Language Honor Societies, and National Art Honor Society. Site A also has students selected for the National Merit Scholars and Illinois State Scholars.

Site B Description

The second high school, Site B, is located within a suburban town that encompasses 3.8 square miles. This high school is one of two high schools within a district that serves 5,876 students and houses grades 9 through 12. The total enrollment at Site B is 2,390, as stated in the 1997-1998 district summary of the school report card. Of the students who attend this school, 65.1% are White, 31.7% are Hispanic, 2.1% are Asian/Pacific Islander, 1% is Native American,

and 0.1% is Black. The attendance rate for these students is 88.1%, which is significantly less than the state's 93.8%. The truancy rate, 11.2%, as well as the mobility rate, 42.4%, are considerably higher than the state's averages of 2.3% and 18.4%, respectively. The graduation rate of 68.1% also falls significantly below the state's average of 81.6%. Among the students at Site B, 19.6% receive free or reduced priced lunches. The district also provides a comprehensive special education program that includes resource programs, self-contained classrooms, educable mentally handicapped and trainable mentally handicapped programs. While on the other hand, Advanced Placement programs and enrichment programs are available for gifted students.

The district currently has 304 certified staff members. Of the 304 staff members in the district, 157 serve at Site B. The ethnic breakdown of teachers in the district is 98.4% White, 1.3% Hispanic, 0.3% Asian/Pacific Islander. The female to male ratio is a 59.1% female to 40.9% males, which is more evenly distributed than the state ratio of 74.9% female to 25.1% male. Of the teachers within the district, the average teaching experience is 12.8 years. Of the district teachers, 43.6% hold bachelor's degrees and 56.4% have their master's degree or higher. The average class size at Site B is 18.5%, and the student to teacher ratio in the district is 21.8:1. In comparison, the pupil to administrator ratio is 226:1. The average teacher's salary in this district is \$51,852, while the starting teacher's salary is \$32,468. The average administrator salary in the district is \$77,726. The state spends \$6,158 per pupil, whereas the operating expenditure per pupil at Site B is \$8,257.

The students at Site B follow one of the following tracks: college preparatory, vocational education, or general education. The core program at the school includes four years of English and at least three years of mathematics, social studies, and natural sciences. The students must earn 20 units of credits to graduate. There is a plethora of extracurricular and co-curricular

programs available to the students. Of those offered, the following are known for their award-winning seasons: soccer, pompons, speech team, yearbook, marching band, and theatre department. Students can also participate in football, baseball, basketball, swimming, wrestling, badminton, volleyball, cross-country, gymnastics, tennis, bowling, golf, cheerleading, chess team, math team, scholastic bowl, foreign language clubs, aviation club, varsity club, SADD, snowball club, dance club, drama club, the newspaper, international club, jazz choir, key club, music club, outdoors club, peer mediation, art club, problem-solving club, assembly club, awaken your mind club, the Bible club, Big Brothers/Big Sisters club, color guard, ecology club, Thespians, and tech guild. A goal of the board, in establishing the diversity of clubs at this site, is to get students involved in order to keep them off the streets.

The Surrounding Community

Community A Description

The Site A community is nestled 30 miles west of a major metropolis, and it contains the county's government seat. The community is considered affluent, and it contains many single-family homes valued around \$186,000. The total population is 54,000 and is broken down into 93% White, 4% Asian, 2% African-American, and 1% other. The top four reported ancestries are German (25.1%), Irish (11.8%), Italian (9.7%), and Polish (9.5%). The community is known as a conservative, church-going town. It contains 12 churches within 1 square mile and more than 20 churches within 11.17 square miles (*local newspaper*).

Twenty-three percent of the community have at least a high school diploma, 22.5% have at least some college experience, 6.8% have completed an associate's degree, 24% possess a bachelor's degree, and 12 % have received a graduate degree. The top three employers for the district are the County Government (2,700), Spraying Systems Company (1,300), and the School

District (1,200). The top three occupations in the district are managerial/professional (35.8%), administrative support (18.1%), and sales (15.3%). The average household income is \$64,297, while the median family income is \$60,709. In the community, 71% own their own homes; in contrast, 24% rent an apartment. The median home value in the area is \$148,700 (*local newspaper*)).

To conclude, the community is conveniently located near four local colleges and universities. Students are also fortunate to be within a 1-hour drive to more than 20 other public and private colleges and universities. Along with these amenities, this community is fortunate to have easy access to a major city (*local newspaper*).

Community B Description

Site B is located in a large urban area and services six communities within 5 square miles. Living in this community affords the residents the luxury of living 10 miles from a major metropolitan city, 18 miles from a major international airport, and walking distance from major commuter rail and bus systems. These collective suburbs have a population of approximately 125,000 citizens. The city where the school is located has a population of 47,935, and there is an average of 2.34 persons per household. Of these residents, 92.1% are White, and 7.9% are Hispanic. The top four reported ancestries are Polish (14.7%), Italian (14.5%), German (13.2%), and Czech (12.1%). Overall, the community is known to have liberal views. (*Local newspaper*).

Thirty-three percent of the community have at least a high school diploma, 19.4% have enrolled in some college courses, 5.7% have received associate degrees, 10.6% have been awarded bachelor's degrees, and 4.4% have completed graduate studies. Although a major hospital is located in this urban area, the absence of much industry compels the residents to seek employment elsewhere. The top three occupations of the residents within the district are

administrative support (24.5%), managerial/professional (23.6%), and craft/repair (12.3%).

Economically, there are 3.9% of the households with an income of less than \$5,000, 8.2% of the households have an income between \$5,000 and \$9,999, 8.2% have an income between \$10,000 and \$14,999, 18.2% have an income between \$15,000 and \$24,999, 17.4% have an income between \$25,000 and \$34,999, 20.3% have an income between \$35,000 and \$49,999, 17.8% have an income between \$50,000 and \$74,999, and 6.0% have an income of \$75,000 or more. The median family income is \$49,787. The dwellings are divided into 61.9% single-family homes, and 38.1% are multi-family units. The median home value is \$112,520 and the median rental price is \$448 per month. It is reported that the community is known for its liberal views, and that the community worships in 22 churches, sends their children to 9 child care centers, and frequents the majestic parks of two separate park districts.

National Context of the Problem

Many people argue over the definition, application, and instruction of critical thinking in the classroom. Ennis, a well-known theorist in the field, has described critical thinking as "reasonable reflective thinking that is focused on deciding what to believe or do" (Gibson, 1995, p. 28). This issue has received increased attention due to the various interpretations of critical thinking, as well as the importance of this issue in the classroom. It has also increased in popularity due to the mounting concern among employers, educators, and public officials that students are not learning the necessary skills to think critically and make appropriate problem-solving decisions (Gibson, 1995). In other words, "they are not learning the thinking and reasoning skills needed to manage the complexity of contemporary life" (Gibson, 1995, p. 27).

Critical thinking is being judged as the most important characteristic of successful individuals in the next century (Gibson, 1995). This has brought critical thinking into the forefront of educational reform and has caused educators to focus on teaching students critical thinking skills. In today's classroom, evidence suggests that students come from homes where intelligent behaviors are not valued; therefore, many students become disheartened and resist a teacher's request to think (Costa, 1981). Furthermore, research suggests that high school and college students do not perform very well on tasks that are used to indicate critical thinking competence (Norris, 1985). Results acquired from testing 8th grade, 10th grade, and undergraduate university students on the Cornell Critical Thinking Test Levels X and Z substantiated Norris' statement by revealing that the level of critical thinking is not very high at any level of schooling (Norris). The Watson-Glaser Test that was given resulted in the following similar findings. Overall, "median scores are low, indicating that at least half of the student population cannot consistently think critically about problems on the tests" (Norris, p. 41). Norris' findings established that most students do not score well on tests that measure one's ability to identify assumptions, review arguments, and examine inferences (Norris, 1985).

There is also research that focuses its attention on the teacher's role of instituting critical thinking in the classroom. Evidence suggests that few teachers are successfully implementing critical thinking into the classroom. In the literature of Ellner and Barnes (1983) and Perkins (1985), most classrooms severely lack activities that initiate critical thinking (Keeley, Shemberg, Cowell, & Zinnbauer, 1995). The focus of this issue centers on teachers.

Critical thinking is an essential aspect of education. It gives students the skills needed to perform adequately essential tasks in the work force. According to philosophers, "critical thinking is not just another educational option, rather it is an indispensable part of education because being able to think critically is a necessary condition for being educated" (Norris, 1985, p.40).

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In order to document the lack of critical thinking skills exhibited in high school students, the researchers administered questionnaires and surveys to students and faculty at Sites A and B during a 3-week period. The purpose of the questionnaires and surveys was to compare teacher and student perceptions of critical thinking usage in the classroom. During the same period, Researchers 1 and 2 recorded observations and anecdotal records, and administered the Cornell Critical Thinking Test Level X (Ennis & Millman, 1985) to targeted students at Sites A and B.

During the first week of the study, researchers surveyed the faculties of the targeted schools (Appendix A) to find out how they incorporate critical thinking skills into their instruction. The researchers separated the questions in the survey into the following five categories: metacognition, strategies to increase thinking, partnership strategies, teaching for transfer, and teaching critical thinking.



Figure 1. Faculty responses to frequency of use of metacognition in the classroom.

Of the total responses to questions where instructors were asked whether they use or teach their students metacognition, the majority of teachers at Site A indicated that they only use and teach metacognition "sometimes," while the majority of teachers at Site B indicated that they use and teach metacognition "often." When combined with the "daily" responses, the responses at Site B suggested that teachers used and taught metacognition on a more regular basis compared to Site A.



Figure 2. Faculty responses to their frequent use of strategies to increase thinking in their classrooms.

The survey revealed similarly impressive findings when teachers responded to whether they utilize specific strategies to increase thinking. According to 48 of the 83 teachers surveyed at Site A and 56 of the 157 teachers surveyed at Site B, more than half the total responses indicated that teachers at both sites use such strategies "often" or "daily." It also was interesting to the researchers that a number of teacher responses indicated that they did not possess an understanding of Socratic questioning. The researchers speculate that either, teachers are not using Socratic questioning because they are not familiar with the strategy, or they are using it, but just are not aware of the term associated with the strategy. It was also interesting to note that teachers at both schools rate similar strategies within the top three they use "daily" or "often." Of

those mentioned, the top three strategies used by both sites include: calling on all students in class, not just those individuals who raise their hands (according to the research, this is a critical thinking strategy); giving 30 seconds of "think time" whenever asking difficult questions; teaching students reading strategies to aid in understanding of texts and printed materials (Site A); and requiring students to do some kind of writing along with a reading assignment (Site B). Also included in the surveys were some useful, narrative, teacher responses. A few teachers note that graphic organizers and modeling are very useful with lower level students. The researchers consider that this may imply that some teachers find graphic organizers too elementary for their more advanced students. It may also indicate teachers believe that more advanced students may not gain the same benefits from their use. Overall, these responses suggest to the researchers that both schools use some critical thinking strategies; nevertheless, teachers at both sites need to incorporate approaches that are more varied into their pedagogy.



Figure 3. Faculty responses to the frequency of their use of partnership strategies in their classrooms.

The next group of questions analyzed from the survey pertained to the partnership between teachers and students. These questions asked educators their views on the role of the teacher in the classroom. The researchers were pleased to see that the teachers at both sites

responded similarly with more than three quarters of the teacher responses indicating a need for partnership in education "daily" or "often." This demonstrates to the researchers that teachers do not see themselves as the bearer of all knowledge, nor do they believe that students should be in the search for knowledge unaided. One teacher said it very well when she responded, "I certainly don't see myself as the be-all and end-all of their knowledge, but I'm uncomfortable saying that I just facilitate their own searches for knowledge." She goes on to note that many students are not even aware that they are on a search or that a search is available to them. Instead, students may just see a particular class "as a hurdle to leap before crossing the finish line of education." Thus, she concludes her viewpoint on the role of an educator by stating, "I'm neither merely an oracle nor a guide dog. I'm a teacher." This statement appears to resonate the belief and conviction of a majority of teachers surveyed.

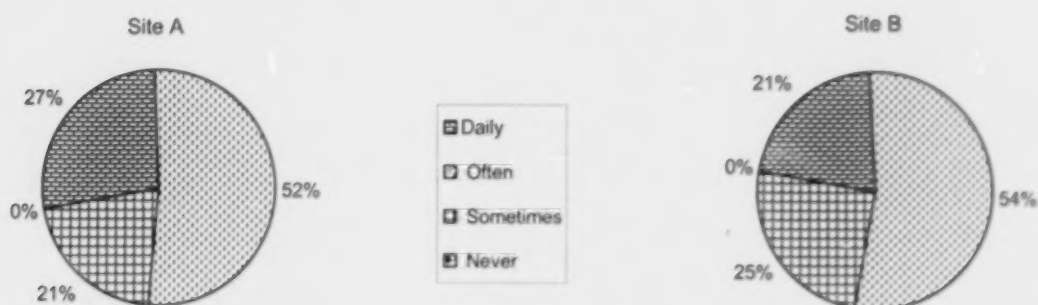


Figure 4. Faculty responses to whether they teach for transfer in their classrooms.

Faculty Survey #1 also had one question that asked teachers whether they taught for transfer. Three quarters of teachers at both sites stated they teach for transfer "daily" or "often." The researchers consider this a positive indicator of educators realizing the need to teach critical thinking skills that apply outside their individual subject areas. Unfortunately, a few faculty

members responded similarly to the teacher who responded, "How should I know what they apply outside my class?"

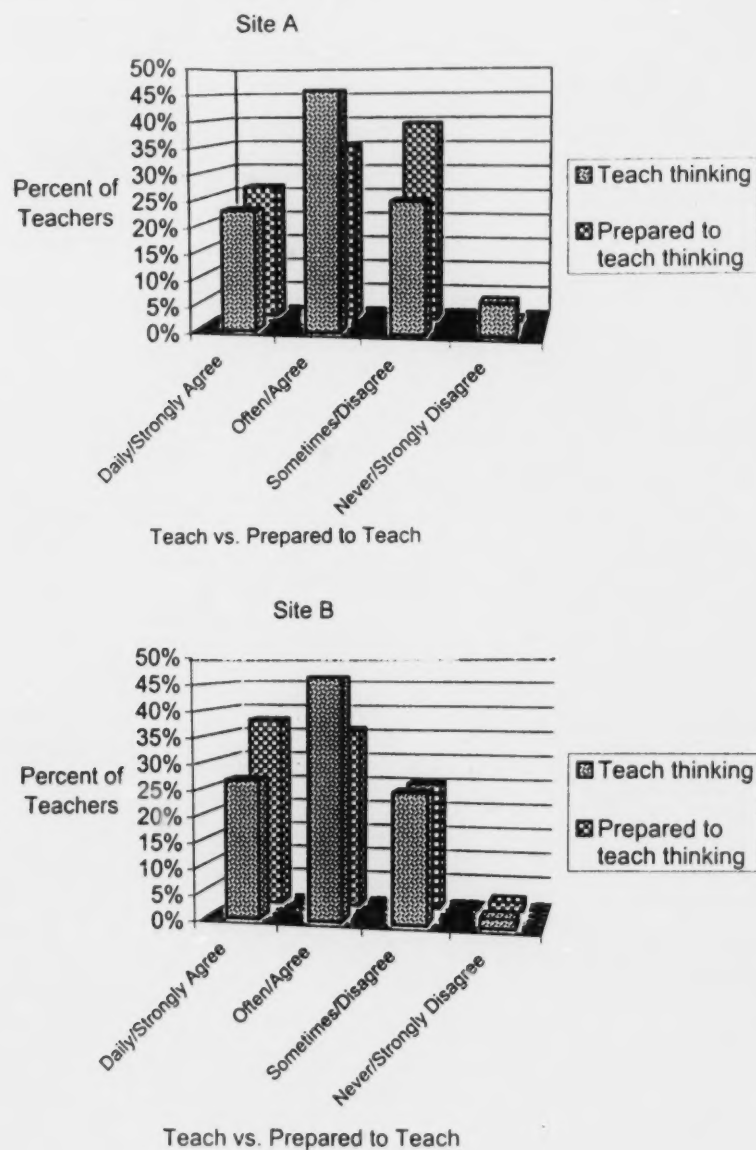


Figure 5. Comparison of faculty responses to whether they teach critical thinking and whether they feel prepared to teach critical thinking.

The final questions on the survey asked teachers whether they teach critical thinking skills, and if they feel prepared to teach thinking skills in their classrooms. These two questions reflected interesting comparisons. At Site A, 69% of the teachers indicated they teach thinking skills "daily" or "often." Yet, 61% of teachers indicated they "strongly agree" or "agree" they are not adequately prepared to teach thinking skills. The results at Site B were even more suggestive. The responses at Site B indicated 73% of teachers teach thinking skills "daily" or "often"; however, 73% of teachers also believed they are not adequately prepared to teach those thinking skills. This indicates to the researchers that although a number of teachers believe they teach thinking skills, they may need additional training in order to improve their current techniques.

To correspond to Faculty Survey #1, Researchers 1 and 2 administered a school-wide student survey to students at both sites (Appendix B). The questions were identical to the ones asked in Faculty Survey #1, and the researchers grouped them into the same five categories.



Figure 6. Students' perceptions of their teachers' instruction of and use of metacognition in the classroom.

The first category of questions asked students if teachers use or teach metacognition. Only a quarter of student responses at Site A indicated teachers use or teach metacognition "daily" or "often," while students at Site B rated teachers slightly higher, with under half the

responses suggesting metacognition is being used in their classrooms. This indicates to the researchers that either it truly is not happening, or students just do not realize that it is occurring.



Figure 7. Students' perceptions of their teachers' use of specific strategies to increase thinking in the classroom.

The next group of questions examined student perceptions of the use of specific strategies used by teachers to increase thinking. According to the 283 surveyed students at Site A, a little less than half the total responses suggested that teachers use specific strategies in their classrooms "daily" or "often." The numbers were only slightly higher at Site B, where a little more than half the total responses of the 163 students surveyed indicated that teachers were using similar strategies in their classrooms. Of the suggested strategies, students at both schools ranked the same top three strategies as the ones that occur most often within their classrooms. They see teachers assigning three key strategies: some kind of writing along with a reading assignment; wait time incorporated with calling on all students in class, not just individuals who raise their hands; and reading strategies to assist students in understanding text and printed materials. This indicates that students recognize when teachers employ lower level critical thinking skills in their lessons.



Figure 8. Students' views on whether an educational partnership exists between teachers and students.

Researchers 1 and 2 also analyzed questions that spoke to the issue of a partnership in the classroom between teachers and students. Students at both sites responded similarly, where a little more than half the responses indicated teachers used partnership strategies in the classroom "daily" or "often." Therefore, it would make sense that a little less than half the students believe that teachers used partnership strategies only "sometimes" or "never." This suggests to the researchers that students see a collaborative relationship between teachers and themselves in the learning process, and over half the responses indicate that teachers are making learning a partnership with students.

The student survey also asked students whether teachers ask them to apply what they learn to real-life situations. The results varied significantly between the two sites. Students at Site A indicated that slightly more than a quarter of their teachers teach for transfer "daily" or "often." Whereas, students at Site B responded that over half their teachers ask them to apply what they learn to real-life situations on a regular basis. This suggests to the researchers that

according to students, not enough teachers make the necessary connections between content material and real life in order for students to make the association.

The researchers discovered similar results when students responded to whether their teachers teach critical thinking skills as part of their class content. Surprisingly, students at Site A believed slightly more than one quarter of their teachers teach thinking skills "daily" or "often." Antithetically, students at Site B conjectured that over three quarters of their instructors teach thinking skills regularly. This could imply that students at Site A see one of two things occurring in the classroom. Either, one, students at Site A do not realize when teachers use specific thinking strategies in class, that they are teaching thinking skills; or two, students do not believe teachers teach thinking skills, thus they are implying that their teachers are spoon-feeding them knowledge instead of helping them to find knowledge. However, it does imply that students at Site B are cognizant that teachers are teaching thinking skills in the classroom.

Interestingly, when comparing parallel responses from Faculty Survey #1 and the Student Survey, Researchers 1 and 2 found notable differences between teacher and student perceptions of the use of various critical thinking skills in the classroom. When Researchers 1 and 2 compared the use of metacognition in the classroom, a little less than half the teacher responses from Site A suggested that teachers use metacognition "daily" or "often." However, only slightly more than a quarter of the student responses suggested that they experience teachers using or teaching metacognition in the classroom. Similar findings were obtained at Site B, where over half the teacher responses suggested their use and teaching of metacognition in the classroom "daily" or "often"; whereas, students suggested a much smaller percentage of responses indicating teachers use or teach metacognition "daily" or "often." This suggests two possibilities to the researchers. Possibly, the teachers surveyed believe they use and teach metacognition

more often than they do. On the other hand, the possibility exists that students are not cognizant of the number of times teachers really use metacognitive strategies.

Conversely, when the researchers analyzed data from questions regarding specific critical thinking strategies used by teachers, both teachers and students responded similarly. The data revealed an 11% difference at Site A and a 5% difference at Site B between teacher and student responses to parallel statements. Equally impressive was the fact that students and teachers mentioned the same three strategies as the most practiced in the classroom. The similarity between the results of these two surveys versus the discrepancies with regard to questions about metacognition implies, to the researchers, that students may not possess the necessary understanding of higher and lower level critical thinking skills, nor do they perceive the occurrence of the higher level thinking skills as readily as the lower level skills. Thus, the students realize when teachers employ lower level skills in the classroom, but they do not always recognize when teachers use metacognition.

Oddly, both researchers were surprised to observe discrepancies that were more noticeable when they compared questions regarding a partnership in learning between teachers and students. Based on these responses, more than three quarters of teachers at both sites considered teaching to be a partnership with students. However, only slightly more than half the student responses suggested the same partnership. These similarities and differences imply to the researchers that students may not understand critical thinking enough to differentiate between some of the questions. However, it may also imply that students resist ownership of adult-inspired tasks. In addition, the data imply that teachers may believe that they are teaching specific critical thinking skills; however, students are not aware that teachers are teaching these skills. Nonetheless, students and faculty agreed when answering questions regarding specified

versus unspecified critical thinking skills. This indicates to the researchers that both teachers and students may not fully understand critical thinking and the process of instruction in critical thinking.

During the second week of the study, the researchers again surveyed (Appendix C) the faculty at both sites regarding their perceptions of students' use of, and application of, skills essential to critical thinking. The researchers then divided the questions on this survey into the following five categories: discussion techniques, decision-making skills, transfer/application, intrinsic motivation, and time-management skills.



Figure 9. Faculty perceptions of students' use of positive discussion techniques in the classroom.

Of the total responses to questions where researchers asked teachers whether their students engage in positive discussion techniques, teachers at both sites were equally divided with almost half the responses indicating students fall in the unsatisfactory range for discussion techniques; whereas, only slightly less than half the responses also suggested that students are satisfactory in their use of positive discussion techniques. Therefore, the research is unconvincing and no conclusion can be established.

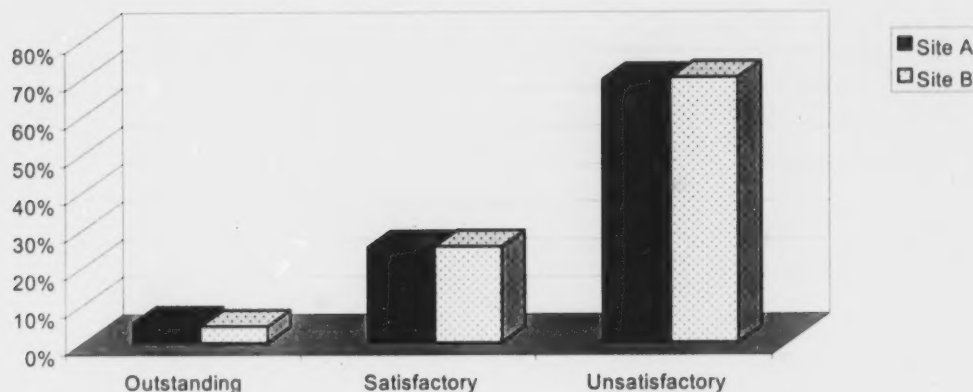


Figure 10. Faculty perceptions of students' use of positive decision-making strategies in the classroom.

The survey revealed findings that were more substantial when teachers responded to whether they see students engaging in positive decision-making strategies. Again, both sites responded similarly. Of the 48 out of the 83 teachers surveyed at Site A, and 56 of the 157 teachers surveyed at Site B, almost three quarters of the total teacher responses indicated that students rank unsatisfactory when it comes to their decision-making strategies and processes.

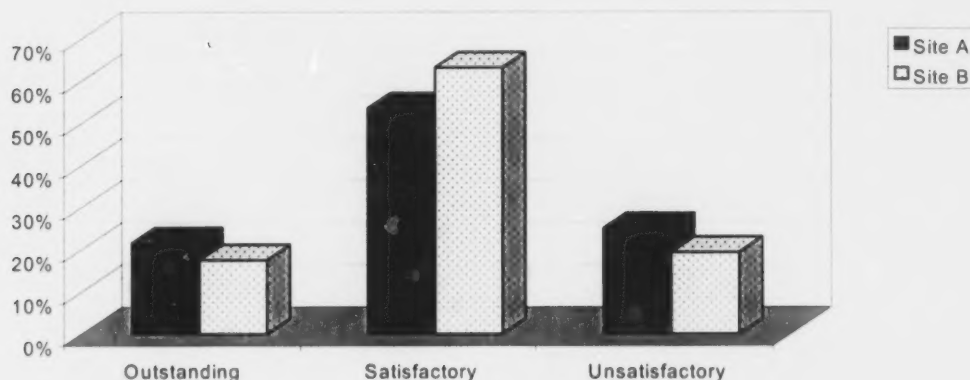


Figure 11. Faculty perceptions of students' transfer of materials from all classes into real life.

The next group of questions asked teachers whether they saw students transferring information from one class to the next or from school to real-life scenarios. At least half the responses from teachers at both sites indicated that students do transfer information and apply it to other areas on a satisfactory scale. This suggests to the researchers that although students are not necessarily using the appropriate discussion techniques and decision-making strategies in the classroom, teachers do see them taking what they learn in the classroom and applying it to everyday situations.



Figure 12. Faculty perceptions of students' intrinsic motivation to perform well.

The findings in the next category differed somewhat between Sites A and B. When researchers asked teachers if students are intrinsically motivated to perform above standards, the responses at Site A dispersed themselves almost evenly between unsatisfactory and satisfactory responses with only a 2% difference between the two results. However, slightly more than half the responses at Site B stated that students' use of their intrinsic motivation is unsatisfactory. This indicates to the researchers that the students at Site A occasionally use intrinsic motivation, but not as often as they are capable; however, students at Site B place more emphasis on the external locus of control for learning.

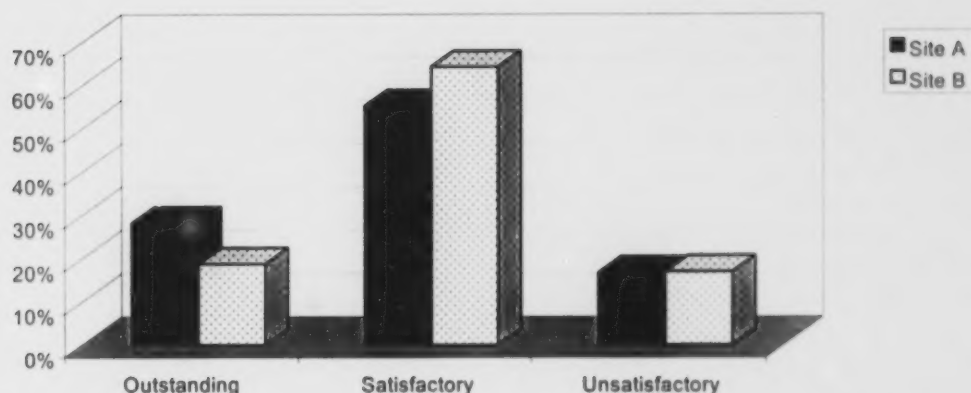


Figure 13. Faculty perceptions of whether students use effective time-management skills during class.

The final questions on the survey asked teachers whether students use class time effectively. Again, both sites responded similarly with the majority of responses indicating students are satisfactory at using class time wisely. Overall, the researchers believe a correlation may exist between the ability to use class time wisely and the critical thinking process. Thus, since students were observed using class time wisely, this may indicate students were sporadically engaged in the critical thinking process.

Researchers 1 and 2 then surveyed the targeted students to gauge their perceptions on how often they use critical thinking strategies (Appendix D). The researchers grouped the survey into the following four categories: positive study strategies, problem-solving techniques, metacognitive strategies, and external locus of control.

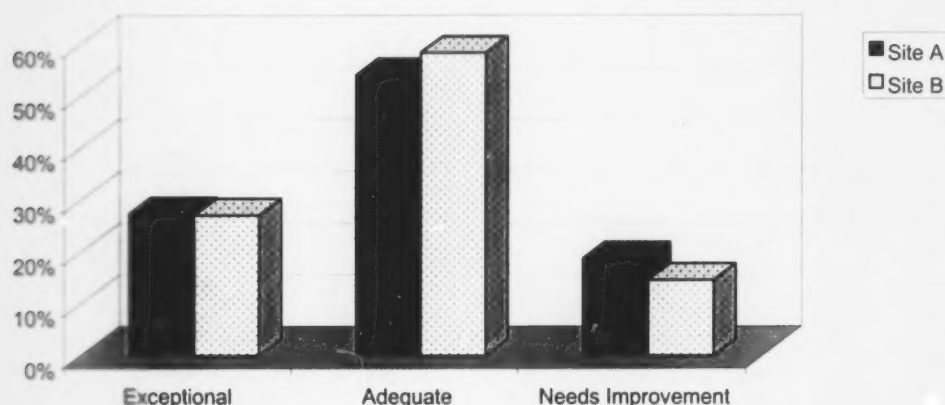


Figure 14. Students' perceptions of their use of positive study strategies.

The first group of questions asked students if they use positive study strategies to complete homework or to study for a test. The researchers gathered similar findings from students at both sites with over three quarters of the student responses indicating they are exceptional or adequate in the use of positive study strategies. This indicates to the researchers that students perceive they are using positive strategies to increase learning.

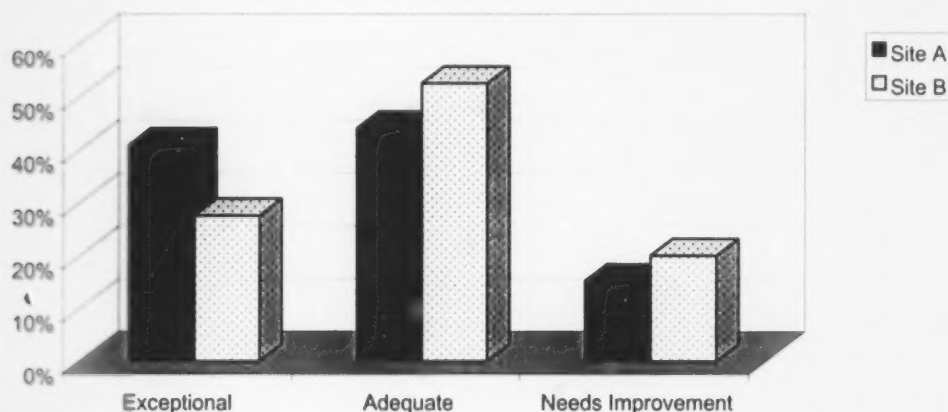


Figure 15. Students' perceptions of their use of problem-solving techniques.

The researchers found an overwhelming majority of students at both sites who responded that they are exceptional or adequate in using problem-solving techniques. Less than 20% of

responses at both sites indicated that students need improvement in this area. This discrepancy, with the results from Faculty Survey #2, suggests that although students perceive they are using problem-solving strategies successfully, teachers are not observing students' use of this skill in the classroom.

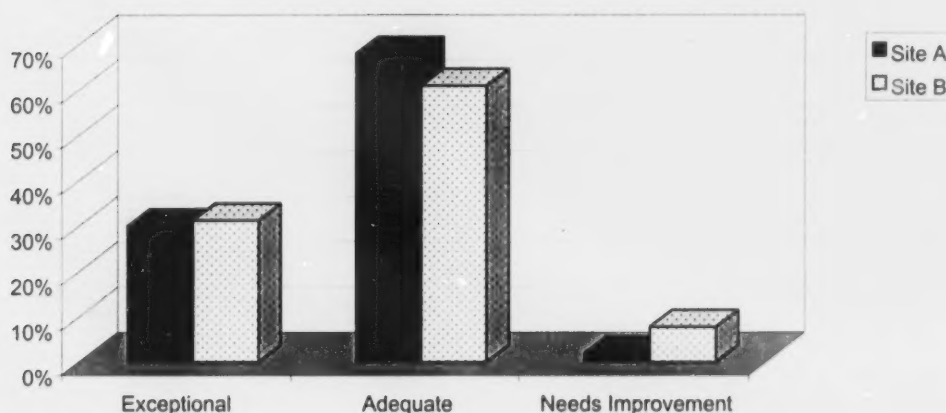


Figure 16. Students' perceptions of their use of metacognitive strategies.

The results for the next category were even more remarkable. Less than 10% of student responses from both sites indicated a need for improvement in metacognitive strategies. Well over half the responses indicated that students are adequate in this area of critical thinking, and more than one quarter of students believe they are exceptional at metacognition. The results from these three categories suggest that the students believe they are frequently using the metacognitive strategies mentioned in the questionnaire to enhance their ability to think and perform in class.

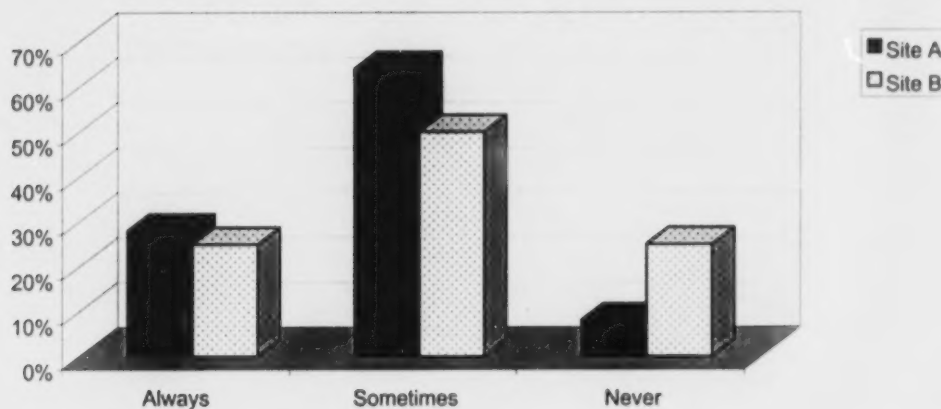


Figure 17. Students' perceptions of educational responsibility in the classroom.

The responses for the questions in the last category varied slightly from Site A to Site B. Of the student responses at Site A, well over three quarters responded that it is "always" or "sometimes" the teacher's responsibility to make the students learn, and less than 10% feel it is "never" the responsibility of the teacher to make students learn. However, Site B student responses indicated that exactly three quarters believe that teachers are responsible for making students learn "always" or "sometimes," and one quarter believe it is "never" the teacher's responsibility to make students learn. This suggests to the researchers that students place most of the responsibility for learning in the area of external locus versus internal locus of control.

During the third week of the research study, the researchers administered a survey (Appendix E) to parents of students in the targeted classes at Site A and Site B. The researchers sent the parent survey home, and encouraged students to bring back the completed surveys by the end of the week. The researchers labeled the questions in the parent survey under the following categories: inquiry investigation, external distracters, parental involvement, positive-study strategies, and student frustration.



Figure 18. Parents' perceptions of their own inquiry or their child's inquiry into homework.

The first category of questions asked parents if their child seeks assistance during homework completion or if parents question students regarding homework. Based on the total parent responses from Site A, the responses indicate that considerably more than three quarters of students' parents are involved in inquiry investigation "sometimes" or "never." Whereas, parent responses at Site B indicate that slightly less than three quarters of students' parents are involved in this inquiry investigation. This suggests that students are not seeking assistance from parents on a regular basis when faced with difficult homework problems, nor do parents question students regularly about homework assignments. However, one cannot dismiss the idea that these results may just indicate a natural tendency of teenagers to avoid parental interactions.

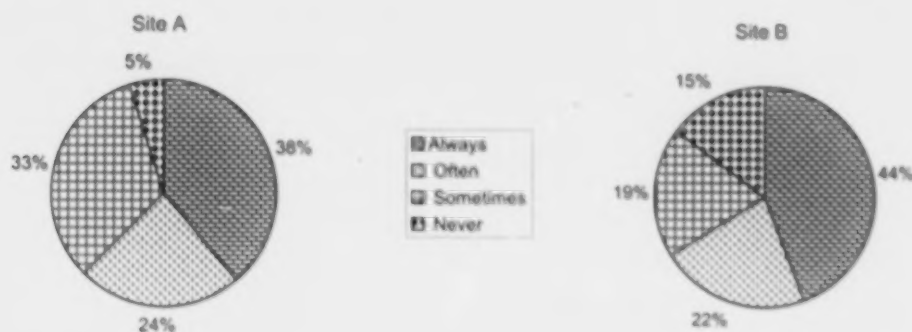


Figure 19. Parents' responses to whether their child studies with external distractors present.

Researchers 1 and 2 also analyzed questions that asked parents whether external distracters such as televisions, telephones, or stereos (see Appendix E) were present or in use while their child was studying. Overwhelmingly, over half the parent responses from both sites indicated that students studied where external distracters were either present or in use. This indicates that students may not be able to give their undivided attention to the task. The researchers believe this may also suggest that if an external distracter is present in the room, there is more likelihood that the distracter may be put to use.



Figure 20. Parents' responses to whether they are involved with their child's homework completion.

The next group of questions analyzed by the researchers asked parents about their involvement in the completion of their child's homework. The responses at Site A indicated a low level of parent involvement with only about one quarter of the parent responses indicating an involvement "always" or "often." However, parents at Site B stated they were more involved with almost half the responses indicating an involvement "always" or "often." This suggests four things to the researchers. Either the parents do not feel comfortable helping because the material is beyond their knowledge or comprehension, parents are not available to offer assistance, students are too argumentative and confrontational to assist, or parents do not feel they should be as involved in high school assignments as they were in lower grades.



Figure 21. Parents' perceptions of whether their child uses positive study strategies in the home.

Another group of questions on the survey centered around the use of positive study strategies in the home. Of the total responses at Site A, slightly more than half the parents responded that their child uses positive study strategies to complete homework or study for a test. Site B was close with almost half the parents responding that their child uses the same positive study strategies at home. However, these findings oppose the responses by parents regarding external distracters. This suggests that although parents see the selected items in the questionnaire as positive strategies to increase learning, they do not regard external distracters as an impediment to positive strategies students are currently using.



Figure 22. Parents' perceptions of their child's frustrations level while completing homework.

The final query on the survey questioned parents regarding their son's/daughter's frustration level while completing homework. Parents at both sites responded similarly with

almost 100% of the parents at Site A responding that their child "sometimes" or "never" gets easily frustrated and gives up on homework; while 100% of parents at Site B responded their child gets easily frustrated "sometimes" or "never" and gives up on homework. This implies that students are attempting to discern and complete homework and do not give up when faced with daunting tasks. However, it may also imply that the homework students are receiving is not challenging enough for them and does not require sufficient problem-solving skills.

In order to document the lack of critical thinking skills in high school English and theatre arts, the researchers administered the Cornell Critical Thinking Test Level X (Ennis & Millman, 1985) (Appendix F) to targeted students in classes at both Sites A and B. Researchers 1 and 2 selected The Cornell Critical Thinking Test Level X because it is one of the few standardized tests available to test critical thinking skills of high school students. In addition, the authors of the test describe it as a general critical thinking test because it attempts to cover critical thinking skills as a whole (Ennis et al., 1985). There are four major areas of critical thinking the test assesses: induction, credibility, deduction, and assumption identification.

The researchers also decided to modify the test for various reasons. The rationale included:

1. To overcome time constraints due to high school scheduling
2. To provide adequate processing time for students
3. To reduce student test-taking anxiety
4. To make the test more accessible for students with low reading ability

Thus, the researchers created a pretest from the even numbered questions and a posttest from the odd numbered questions. The researchers elected to use this testing procedure for two reasons. First, the Critical Thinking Manual suggests this method when dealing with issues of time

constraints. Second, the "Spearman-Brown" method of reliability ranges from .67 to .90 for split half administration of the Cornell Critical Thinking Test Level X. Therefore, the pretest and posttest established by the researchers would theoretically be equivalent (Ennis, Millman & Tomko, 1985). The researchers then evaluated the test using the formula rights minus one half the number wrong as suggested by the Cornell Critical Thinking Test Level X Manual. They selected this method of evaluation because the instructions, read to the students, cautioned students against making arbitrary guesses. This technique is consistent in the researchers attempt to cultivate careful thinking habits (Ennis et al., 1985).

Researcher 1, from Site A, administered this test to heterogeneously grouped 11th grade students of varied ability levels. Researcher 2, from Site B, administered the same test to heterogeneously grouped 9th through 12th graders of varied ability levels.

Table 1

Results of the Cornell Critical Thinking Test Level X Pretest

	Mean	Median	Mode
Site A	23.41	24	25
Site B	21.43	22	24

Note. The values are based on correct student responses out of 40 possible responses.

As indicated in Table 1, the mean score of students at Site A indicates that the average score awarded on the pretest was 58.525%; whereas, the average score received by students at Site B was 53.575% on the same test. These scores may be similar to those of other students in the testing sample, but they do indicate room for growth. However, after using the test and evaluating the results, both researchers feel the need to express their disapproval with the test. Neither found it a valuable indicator of student growth since it had no connection to the

implemented strategies or to the students' lives. Additionally, the test manual did not provide sufficient normative information, making any comparisons difficult.

Probable Causes

If almost all college and university teachers advocate critical thinking as a fundamental goal of education, then why the discrepancy between what is praised and what is practiced (Keeley, Schemberg, Cowell, & Zinnbauer, 1995)? As previously documented in chapter one, a heightened awareness in the critical thinking movement has occurred in recent years "as a result of increasing concern among employers, educators, and public officials that students are not learning the thinking and reasoning skills needed to manage the complexity of contemporary life" (Gibson, 1995, p. 27). Due to the data that suggest students are not bringing the appropriate thinking skills into the market place, one begins to question "Why." Why are students not prepared to handle complex tasks and make logical decisions? Upon launching an investigation into possible causes, one will find a multitude of literature exists suggesting several underlying reasons for the lack of critical thinking in the classroom and the work place.

To begin, students need to realize that the goal of education is "thinking." Too many times, students just recite information garnered from a reading selection and repeat this same material back to the instructors. In Thacker's research (1990), he found that most teachers devote 75-85 percent of their instructional time to the memorization of factual material (p. 30). Yet, the research suggests that this practice undermines the goal of having students learn to gather, question, analyze, synthesize, and formulate ideas and opinions. Unfortunately, even with the research out there, many students are still receiving this method of instruction (Pawlowski, 1999, p. 92).

Another problem in the teaching of critical thinking is that teachers may sometimes assume that a student possesses the knowledge or capability to perform a given task. As indicated in the research, "a student's ability to understand and master critical thinking varies with age" (Pawlowski, p. 93). Interestingly, Wimbey (1976) noted, "not all humans achieve the level of formal operations" (as cited in Costa & Lowery, 1989). Thus, teachers cannot assume that all students have reached the same level of learning capability. This suggests that if teachers are assuming that all students are capable of understanding how to think critically, then some students are not receiving necessary information to facilitate cognitive development of critical thinking skills. According to Haas and Keeley (1998), another poor assumption that teachers make is the belief that "students can internalize critical thinking by a process very similar to osmosis..." (p. 64). Simply stated, they believe that students will be able to think critically merely by being in the presence of critical thinking educators.

When searching for answers, one must also look at societal reasons for the lack of critical thinking in the classroom. In a world where immediate gratification prevails, it is unrealistic for educators to think that this behavior is not infused into the educational process. Beyer (1997) argues that mental deficiency is not the cause of flaws in student thinking; instead, low-quality thinking is a natural human behavior. Humans are too quick to jump to conclusions. They have a natural tendency to view issues from one point-of-view, thus limiting their ability to fully evaluate and make a rational decision. In other words, it is easier to make a decision based on what they already know than it is to search for answers and look at a problem from all sides and angles (as cited in Pawlowski, 1999). According to Keeley et al. (1995), it is also in human nature to avoid change, work, and pain. Thus, this avoidance limits students' willingness to think critically. In other words, students may believe that:

(1) the effort to change is too difficult, that they cannot tolerate the discomfort of doing what's required, that it's easier to drift along than to work to change; (2) they are unable to change, their problems are too big, and they are too weak to conquer them; (3) they must completely control their destiny and have absolute freedom to do what they like; and (4) they may rebel against the teacher or learning because they see them as impinging on that freedom. (p. 144)

However, if students are going to learn to think critically, it will require them to be self-directed and to try things at which they are not good, yet. This is frightening for students because it will require taking risks, fighting fears of failure, and fighting fears of the unknown (Keeley et al., 1995). Thus, students would rather not attempt to try this new approach to learning. This leads to another probable cause for the lack of critical thinking occurring in the classroom, student apprehension or resistance.

According to Keeley et al. (1995), educators are faced with the crucial question of "How do we overcome student's resistance to learning critical thinking?" (1995). With the invention of the Internet, and the way of life in modern America, students are apathetic when learning requires work. They are much more inclined to gain knowledge at the touch of a button, instead of having to work hard to figure out the solution. Students have also been educated in a system that tells them their answers are not valid if a teacher does not give feedback or reinforcement. Thacker (1990) states that throughout their education, students have relied on teachers to either endorse or criticize their thoughts. Thus, they have grown to depend on teachers as they try to investigate new ideas (p. 31). This practice hinders students' abilities to develop their own critical thinking skills. This also supports Yildirim's argument (1994), when he noted, "students are more comfortable with learning in structured ways and often are not eager and enthusiastic

about new ideas and perspectives" (as cited in Supon, 1998, p. 295). Instead of wanting to complete an activity that involves some problem-based learning, students are more content to sit and complete worksheets, or take notes on class lectures. This apathy is the challenge to educators.

Another hindrance in trying to get students to develop and utilize critical thinking skills stems from the fact that students rarely question learning or their own thinking. Sternberg and Wagner (1982) documented, "students often follow directions or perform tasks without wondering why they are doing what they are doing. They seldom question themselves about their own learning strategies or evaluate the efficiency of their performance" (as cited in Costa & Lowery, 1989, p. 64). The implication is that some students have no idea what to do when they are confronted with a difficult problem, nor are they able to explain or reflect upon their decision-making strategy. Schoeman (1997) noted similar findings when he stated, "students, accustomed to receiving knowledge, are often not accustomed to question knowledge, to challenge underlying assumptions, to see inconsistencies and irrelevancies" (p. 20). Again, this is due to the method of instruction educators continue to utilize in the classroom. If students are not getting the opportunity to challenge information in the classroom, they will not learn to challenge information in life.

Along with student apprehension, one must also consider teacher apprehension and resistance in the teaching of critical thinking. Sometimes, one must recognize, it is the teacher who is the problem. Thus, to begin to cope with the resistance of students, educators must first learn to cope with their own resistance to teaching critical thinking (Haas & Keeley, p. 63; Keeley et al., p. 144). The first step in this process is to recognize the series of myths that teachers believe in regard to critical thinking. In a faculty workshop, Ruggiero (1988) stated that

many teachers "resist efforts to improve thinking in their classrooms because they believe: thinking cannot be taught, students are naturally and irremediably dull, the quality of students is declining and there is nothing that can be done about it, and others are teaching "thinking" so it is not an accountable responsibility of this course (as cited in Hunter, 1991, p. 73). Based on his findings, it is essential to look at the root of the problem and to try to understand where educators fall short.

According to research, there are several reasons why teachers are not teaching students critical thinking skills in the classroom. The first reason is that some teachers are resistant to try new techniques. This may be due, in part, to the fact that many educators have not experienced critical thinking as part of their own educational process (Haas & Keeley, 1998). Thus, they teach what they know. Furthermore, Ennis (1987) and Paul (1993) also have evidence that suggests that many teachers have not adopted critical thinking as valuable, do not understand its concept, and are not convinced of its importance (as cited in Haas & Keeley). Thus, if teachers do not give credence to its importance, and lack an understanding of what critical thinking means, then they will be unwilling to try to adopt new methods of instruction into their pedagogy (Haas & Keeley, 1998).

Another reason teachers are not teaching thinking skills is because many teachers are busy trying to teach content, and for them, teaching critical thinking interferes with content coverage (Haas & Keeley, 1998). This focus on content stems from the constant scrutiny of education and its practices; hence, administrators continue to urge teachers to cover more content to appease society. Thus, many faculty members continue to use a lecture-discussion method of instruction and resist employing a more student-centered approach to instruction because it takes time away from presenting content. Cole claims that too often actual thinking is sacrificed for

content rich rote work (1990). Although the research suggests that using critical thinking strategies in the classroom will slow the progress of content coverage, teachers must recognize that the ultimate goal of teaching is to bestow upon students the ability to think critically. When students develop positive thinking skills, they possess the ability to progress beyond the memorization of content to the depth of understanding complex problems. Students will then be able to transfer these skills into lifelong learning.

Teacher methods of instruction, and the lack of critical thinking preparation for instructors, are two additional obstacles affecting faculty resistance. Teachers need to be aware of critical thinking skills and aware of how to use them before they will be successful in their implementation. Unfortunately, one impediment is the fact that a lack of practical instructional strategies for teaching critical thinking exists (Hannel & Hannel, 1998). Thus, many teachers are still concentrating their instructional efforts on the use of lecture in the classroom. Alarming, Thacker finds, "Most teachers devote approximately 75-85 percent of their instructional time to the memorization of factual material (1990, p.30). Furthermore, Thacker finds many teachers still view themselves as imparters of knowledge. They still do not acknowledge education as a collective learning process with students as engaged, interactive learners. This is unfortunate because the research (Meyers, 1986) argues that the lecture method does not allow students adequate time to interact with and process information (as cited in Wilcox, 1988). Additionally, learning is not a static event or a passive activity; students are not sponges just absorbing material. They need to be active participants in the learning process. They do not just learn from answers, but from being asked to justify their positions and support their arguments (Shoeman, 1997, p.19). Thus, with the lecture method of instruction, teachers do not give students the means to foster critical thinking and to question the information presented.

Textbooks present further problems when it comes to teacher methods of instruction because they are structured to cover content and do not focus on stimulating critical thinking in the classroom (Haas & Keeley). In addition, the assessment materials garnered from textbooks have a tendency to emphasize memorization of facts. These tests provided by textbooks simply provide test banks with easy-to-grade multiple choice and true-false questions. A Boston College study for the National Science Foundation confirms that tests like these, along with "standardized tests force teachers to teach lower level thinking skills and rote memorization" (Tener, 1995, p.72). The study also states that such tests distort the curriculum because they encourage teachers to "teach for the test" (Tener, 1995). Thus, with so many concerns regarding teacher methods of instruction, teacher training and the educational structure should be addressed.

Besides coping with faculty resistance, teacher training on the use and instruction of critical thinking in the classroom is deficient. The research indicates that not all instructors are effective in teaching critical thinking skills (Pawlowski, 1999). The research also suggests teachers may not be effective teachers of critical thinking because they have not been specifically trained to teach thinking skills and strategies; thus, they lack the confidence to implement these techniques into their classrooms (Haas & Keeley, 1998; Pawlowski, 1999). Substantiating this is a study by Yildirim (1994) that found "over half the teachers in the study stated they had only adequate skills for improving thinking, and approximately 14 percent did not believe they had even adequate skills" (as cited in Supon, 1998, p. 294). Thus, it stands to reason that teachers cannot teach students skills they are unsure of themselves.

In addition to teacher training, the school system and educational structure continues to hinder progress in the area of critical thinking instruction. Today's educators face problems of

large class sizes, lack of time to engage in collegial discussions and reflection, and lack of high-quality professional development activities related to ways of engaging students on a thinking level (Court, 1991; Haas & Keeley, 1998). Haas and Keeley also suggest there may be negative ramifications on one's evaluations upon initial implementation of critical thinking into one's curriculum. Thus, due to the time and effort involved in effecting a change in one's methods, the problems listed above need to be rectified.

The final problem facing researchers is how to assess the effectiveness of teaching critical thinking. In order for one to ascertain the efficacy of implemented strategies, one must be able to objectively evaluate growth in critical thinking. Yet, there exists a "paucity of methods for appraising curriculum programs for teaching essential skills" (Tener, 1995, p. 100). Moreover, due to the nature of critical thinking, the use of standardized tests is inadequate since its focus is the assessment of quantitative skills as opposed to qualitative outcomes of instruction. With this in mind, one needs to scrupulously investigate the validity of assessment tools when trying to evaluate critical thinking growth. The thrust of evaluation should be much more formative and diagnostic and less focused on measuring mastery.

To conclude, Court (1991) summarizes it best when she states, "The school is still, to a great extent, authoritarian, right-answer slanted, and examination driven—conditions that are not conducive to critical thinking. These structural lags in the system itself impede teachers who are actively pursuing the goal of achieving a critical-thinking classroom" (p. 118). Thus, in order to adequately affect a change and try to improve critical thinking in the classroom, all levels of the educational structure need to be addressed and improved.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

The current trend in education is towards a classroom where critical thinking skills are integrated. Norris contends that critical thinking is an indispensable part of education (as cited in Grice & Jones, 1991, p. 337). Students today need to be prepared to adapt to their changing environments. Thus, much support is generated for the instruction of thinking skills. However, as Hunter (1991) states in his *Focus on Critical Thinking Skills Across The Curriculum*:

All academic disciplines must accept responsibility and accountability of exposing students to and training them in the basic higher-order thinking skills that will provide them with the cognitive processes to confront a rapidly changing world and to be free to explore the unknown future. (p. 74)

It is not the sole responsibility of one discipline to teach thinking skills. Instead, students need to learn and use thinking skills throughout the school day (Wilcox, 1988). Through the pedagogy of these skills in all subjects, students will learn that these skills transfer to all areas of learning. Thus, instead of giving students answers, educators need to give students skills to question, learn, and discover on their own.

In order for students to be properly prepared for the 21st century, they should be taught the skills that will enable them to draw inferences, apply logical reasoning, make informed decisions, and solve real-world problems. Therefore, they are reliant upon their educators to provide them with these necessary skills. According to Piaget's theory, "the transition from concrete to formal thinking takes place at the beginning of the secondary

school age" (as cited in Hunter, 1991, p. 72). Based on this knowledge, Hunter believes high school students are at the teachable stage and maturation level where higher order thinking skills can be effectively introduced. Thus, the question for high school educators is, "How do I foster the development of critical thinkers?" (Court, 1991, p. 117).

According to the research, there are numerous approaches to help eliminate the lack of critical thinking by high school students. Some solutions recommended by Court (1991) are not necessarily within the realm of teacher control, such as time for collegial discussion and reflection, reasonable class sizes, and high-quality professional development activities centered around engaging students in thinking (p. 118). However, there are a number of solutions that teachers can certainly utilize. These solutions fit within several different categories: classroom climate, questioning techniques, teacher responses, thought-full language, and content. (Costa & Lowery, 1989; Thacker, 1990).

The first solution focused on classroom climate. To develop critical thinking skills, it is essential that students feel comfortable to share and voice opinions in the classroom. In this regard, the classroom climate should be open, supportive, and structured (Thacker, 1990, p. 28). The research supports that a climate conducive to higher student achievement should be centered around a "well-structured classroom where (1) students know the objectives of the lesson; (2) time is used efficiently; (3) the teacher is clear about directions; (4) the classroom environment conveys a congenial sense of order; and (5) student energies are engaged in a meaningful learning task" (as cited in Costa & Lowery, 1989, p. 10). If students are aware of the objectives for the lesson, and the teacher is clear about directions, students will not expend precious energy and time trying to figure out the teacher's intentions. Costa and Lowery believe students

also must recognize that the goal for the lesson is thinking, and the responsibility for the thinking is theirs (p. 11). This is a difficult transition for teachers because they must progress from the role of ultimate authority or the font of all knowledge, to the role of facilitator. By achieving this transition, the classroom climate will be auspicious for critical thinking to thrive.

Next, if the climate portrays a sense of order, students will feel comfortable to express opinions, explore ideas, and voice concerns. Along the same premise, they also will feel as though they can be valuable contributors to the class. With a sense of order in the classroom, students feel respected by the teacher and other students. According to Court (1991), "Good thinking in the classroom is closely connected to how well the people in the classroom are relating to each other" (p. 118). Thus, if students and teachers respect one another, more participation will take place and more thinking will be evident.

Finally, if teachers engage students in meaningful learning tasks, they will help contribute to the students' intellectual development. These tasks include both Socratic-type discussions and group work. Students need to be faced with challenging activities that teach them particular skills not just random information. Students will be more successful if they gain the skills to find an answer versus just restating a memorized fact. Through these and other meaningful tasks, teachers will produce positive attitudes toward critical thinking (Costa & Lowery, 1991; Thacker, 1990).

Another suggested approach to increasing critical thinking in the classroom focuses on questioning techniques. The research indicates that students retain long-term memory of 35% or less from memorizing facts, while the retention of thinking-skill processes is approximately 80% (Thacker, 1990, p. 30). It is important that educators

recognize this correlation and use questioning accordingly. Thacker also believes that questioning should go beyond just content knowledge to include the cognitive levels of analysis, synthesis, and evaluation (p. 30). Thus, educators should try to develop questioning skills that incorporate all six levels of Bloom's Taxonomy in order to ensure that critical thinking is being fostered.

Teacher responses are another solution discussed in the literature to help increase critical thinking (Costa & Lowery, 1989; Court, 1991; Thacker, 1990; Wilcox, 1988). Costa argues that teacher responses are largely responsible for creating the classroom climate essential to fostering student thinking (as cited in Thacker). Even more remarkable is the research that found "the way the teacher responds has more influence in determining students' behavior than the questions the teacher asks" (Lowery, 1990, p. 30). Apparently, because students are constantly trying to anticipate how a teacher will respond or react to their statements, they are not necessarily focused on the thinking process. Accordingly, researchers have proposed the following teacher responses that seem to positively impact student thinking. The first suggestion is to use extending or open responses. These responses, according to Thacker, require students to become more original and innovative in their thinking (p. 30). When teachers use open responses, students do not feel that they must give the "correct" response. Instead, they feel comfortable to explore possibilities. Another suggested response type made by Lowery is one that is a nonjudgmental, nonevaluative response. Research has found that these type of responses help to extend thinking. These responses fall into three categories: passive, active, and empathic (empathetic) (Lowery). During passive acceptance, the teachers acknowledge all statements; however, they do not place value on it. For active

acceptance, the thoughts of the student are summarized or praised, but nothing is added or changed. Based on research, active acceptance seems to be more meaningful to students than passive acceptance because it not only says, "I heard what you have to say," but it also acknowledges an understanding of the response (Costa & Lowery). The difference with empathic (empathetic) acceptance is not only are the thoughts of the students accepted, but their emotions are accepted as well (Lowery, p. 31). Yet another suggested solution regarding teacher responses involved wait time. The research indicates a number of positive outcomes if teachers incorporate wait time into their questioning. If teachers provide wait time before calling on students, their answers tend to be more elaborate and more creative. According to Rowe (1974), the research has also shown that student-to-student interaction increases, the number of questions that students ask increases, and the contribution of shy students tends to increase (as cited in Costa & Lowery, p. 41). Students recognize that with silence, teachers are translating their expectations. Costa and Lowery agree that by using wait time, teachers are telling students they value what students have to say, and they not only expect an answer, but they have faith in the students' abilities to answer (p. 41). Interestingly, it is not only important for teachers to provide wait time to students, but it is necessary for teachers to wait after a student asks a question. By doing this, teachers model highly regarded traits of effective thinkers: thoughtfulness, reflectiveness, and restraint of impulsivity (Costa & Lowery, p. 42). If teachers want to impart critical thinking skills to their students, it is essential they model the very same traits and skills in their own thinking. This is also imperative when teachers reflect on the language used in the classroom.

When preparing lessons, teachers spend considerable time focusing on content and less time focusing on the word choice to be used during instruction. However, the research indicates it is just as important to focus on the language used within the lesson. "Numerous psychologists believe that language is the most important component of intelligence (Costa & Lowery, 1989, p. 53). Therefore, if language is the connection to cognition, then teachers need to develop a cognitive language. According to Costa and Lowery, "if we surround students with *thought-full* language, we are using a powerful vehicle to make reflective thinking part of their everyday lives (p. 54). Hence, it is essential that teachers examine the language used in their classrooms to ensure it encourages *thinking*. When teachers speak *thought-fully*, using precise language, they model for students the terminology of a reflective, critical thinker. Ennis (1985) asserts that, "critical thinkers are able to use specific terminology, refrain from overgeneralizing, and support assumptions with valid data (as cited in Costa & Lowery, p. 60). Thus, teachers can develop these characteristics by focusing on the language used in the classroom and by striving to use specific thinking terms rather than vague abstract terms.

The final recommended solution to help increase critical thinking emphasizes content. When teaching content, it is important that teachers instruct students in metacognition. Much research suggests that students who are able to think about the process of thinking perform better on complex tasks (Bloom & Broder, 1950; Brown, 1978; as cited in Costa & Lowery, 1989, p. 65; Whimbey, 1980). Therefore, Costa and Lowery suggest if teachers want to develop effective thinking and intelligent behavior in students, then they must incorporate instructional strategies designed to develop metacognitive abilities. (p. 66). The five metacognitive instructional strategies indicated

are: (1) to have students develop study questions prior to and during the reading of content material; (2) to have students reflect upon and evaluate their actions and activities; (3) to outlaw "I can't"; (4) to have students restate, paraphrase, compare, and translate each other's ideas; and (5) to have students utilize a journal (Costa & Lowery, p. 66-72). Through these strategies, students will learn to reflect upon the thinking process, thus becoming more effective thinkers.

Evidence shows that sound thinking helps develop content mastery (as cited in Cole, 1990, p. 10). If teachers want students to acquire content-specific knowledge, they need to accept responsibility for the pedagogy of thinking skills. Furthermore, Nathan (1986) summarizes, "Students need much more than basic skills; they must also become thoughtful, responsible problem-solvers (as cited in Grice & Jones, 1989, p. 337). Hence, all educators must accept responsibility for this task.

Project Objectives and Processes

As a result of an emphasis on critical thinking skills within the classroom, during the period of January 1999 to May 1999, the high school students in the targeted classes will increase their ability to use critical thinking skills in English and theatre arts, as measured by the Cornell Critical Thinking Test Level X, teacher-made tests, journals, graphic organizers and portfolios.

In order to accomplish the project objectives, the following processes are necessary:

1. Materials and language that foster critical thinking in English and theatre arts will be developed.

2. A series of learning activities that stimulate critical thinking will be developed for both English and theatre arts.
3. Curricular units reflecting these decisions will be constructed.

Project Action Plan

- I. Address meaning of critical thinking
 - A. Teachers will deliberately use thought-full language in the classroom
 - B. Students will be taught thought-full language
 1. Students will be given handouts defining thought-full terms
 2. Students will be encouraged to use these terms in classroom discussion
- II. Taught how to use critical thinking
 - A. Teachers will model strategies for comprehension
 1. Teacher read-alouds
 - a. Teacher paraphrase
 - b. Student paraphrase
 - c. Student written summary
 2. Student read-alouds
 - a. Teacher paraphrase
 - b. Student paraphrase
 - c. Student written summary
 - B. Students will begin performing strategies
- III. Questioning techniques
 - A. Socratic method
 - B. Open-ended questions

- C. "Think time"
- D. Fat/Skinny questions
- IV. Multiple Intelligences
 - A. Activities developed
 - B. Projects developed
- V. Graphic Organizers
 - A. T-chart
 - B. Venn diagram
 - C. Mind map
 - D. Word web
 - E. PMIs
 - F. KWLs
- VI. Journals
 - A. Metacognitive journals
 - B. Journal logs
 - C. Journal stems
 - D. Reflection/Analysis journals
- VII. Transfer techniques
 - A. Apply to other content areas
 - B. Apply to real life

Methods of Assessment

In order to assess the effects of the intervention, lessons that require critical thinking in English and theatre arts will be developed. In addition, checklists,

questionnaires, surveys, and interviews will be conducted with students and faculty as part of the assessment process. To conclude, *The Cornell Critical Thinking Test Level X* will be administered along with various teacher-made tests in order to assess the outcome of the intervention.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

The objective of this project was to increase critical thinking in the high school classroom. The researchers achieved the implementation of this goal through teacher and student read-alouds, questioning techniques, graphic organizers, journals, multiple intelligence projects, and the use of transfer techniques.

The first intervention began with teacher rephrasing, predicting, summarizing, and questioning of materials read aloud during class. These materials included sections from novels, sections from scripts, short stories, scenes from plays, poetry, and assignment directions. During these read-alouds, either the teacher or the students would read from the given material. Then the teacher would stop the reading at various sections and would rephrase, predict, summarize, or question what was happening. The researchers modeled these techniques for students at the outset of the intervention with the goal of having students perform these skills by the end of that week. However, the instructors modified the goal for the weeks end due to student success and had students actively performing these strategies by mid week. To further encourage students to use these critical thinking techniques, the researchers developed bookmarks (Appendix G) that reminded the students to actively employ these strategies while reading assigned materials on their own or out loud in class. The teachers also made sure that students were able to rephrase and repeat assignment directions before students were able to proceed with the given task.

Next, the researchers employed various questioning techniques to increase student critical thinking in the classroom. These techniques included Socratic method,

open-ended questions, wait time, fat/skinny questions, and thought-full language. The researchers used the first technique, Socratic method (Appendix H), both to analyze material in class and to answer student questions about material in class. The Socratic method of questioning required the teacher to answer a question with a question. For example, if a student were to ask, "Why did the Romans use so much sex and violence in theatre?" The teacher would respond, "Why do you think they might have introduced so much sex and violence into their entertainment?" This technique enables students to formulate and hypothesize ideas on their own, thus, encouraging the use of critical thinking.

The next method of questioning involved the use of open-ended questions. For these, the teacher asked students questions that had no specific correct answers. Therefore, as long as a student was able to support his answer logically, then the answer was acceptable. The goal was to de-emphasize the teacher's validation of whether an answer was "right" or "wrong." Therefore, it encouraged students to formulate and consider all possibilities, rather than focusing on finding the "one" correct response.

The third questioning practice utilized to encourage critical thinking was the use of wait time with questioning. This technique required teachers to wait approximately 30 seconds after asking students a question and before calling on a student for a response. The goal of introducing wait time into the questioning process was to encourage all students to formulate an answer, instead of some students waiting for other students to respond to the question. Thus, the aim was to engage all students during questioning and discussing. This strategy also discouraged students from "calling out" answers in class without giving thought to their responses. Another form of this technique used by the

researchers was to have all students write their answer(s) down during the 30-second wait time. While students were to be responding on paper, the teachers moved throughout the room ensuring that all students were engaged in the thought process.

Another questioning strategy integrated into the classroom was fat and skinny questions. The technique of using fat and skinny questions required the instructors to use two types of questions. The skinny questions were ones that required basic recall of information from material in class and typically only had one correct response. Conversely, fat questions required more analysis of material and typically had unlimited answer potential. To begin, the instructors prepared questions prior to the lesson to ensure the use of both types of questions. The instructors also used both types of questions on tests and quizzes. Lastly, the instructors required students to create both fat and skinny questions to use in class discussion and review.

The final questioning technique was the use of thought-full language. Here, the researchers were careful to select precise, thought-provoking terminology. Instead of just asking students to state how something may have made them "feel," or what they "think," the researchers would ask students to compare, predict, classify, analyze, speculate, conclude, and hypothesize. Again, the instructors modeled this technique and students were then required to do the same when formatting their own questions for the class.

Yet, another critical thinking technique employed by the researchers was the use of graphic organizers. A plethora of graphic organizers exists, which enable students to organize their thoughts and ideas visually. Graphic organizers were also used to help students form a concrete image from an abstract concept. The researchers selected the

following graphic organizers to apply in their intervention: T-charts, Venn diagrams, webbing/mind mapping, PMIs, and KWLs.

The instructors used the T-chart (Appendix I) many times for various lessons. One lesson had students stating what positive communication looks like and sounds like. A second T-chart activity involved students listing characters, setting, and plots in a three column T-chart. Another activity had students using one side of the T-chart to list initial thoughts on a topic, and then listing reflective thoughts about the topic after reading an assignment. A fourth activity involved students using a T-chart to list technical and performance aspects of theatre according to a particular era in theatre history. The final use of T-charts was for behavior modification.

The researchers utilized a Venn diagram (Appendix J) to help students compare/contrast two characters in a novel, a novel to a movie, the Greeks to the Romans, Romans to Today, Religion to theatre, color of light to the pigment of paint, and a period in a novel to modern day times.

The next graphic organizers, mind mapping (Appendix K) and webbing (Appendix L), were used to teach the elements of scene design, stage terminology, and character attributes in theatre class. It was also used in English class to organize thoughts for a five paragraph essay, to list character attributes from a novel, and to analyze themes of novels.

The final two graphic organizers selected for the intervention were PMIs (Appendix M) and KWLs (Appendix N). The researchers had students use PMIs as a reflection on an assignment, self-assessment, reflection on a movie, and response to a reading. The students also used KWLs as pre-reading/final reflection activities to

demonstrate their prior knowledge, desire for knowledge, and knowledge gained during the study of a subject/topic.

The use of journals as an intervention to increase student thinking was widespread. The instructors had students use metacognitive journals (Appendix O), journal logs, and journal stems (Appendix P) for reflection on reading and class assignments. Also, journals were used for self-assessment, and assessment of teaching techniques and unit activities. (Appendix Q and R)

The researchers also used multiple intelligences (Appendix S) as a stimulant for critical thinking. Both instructors organized one culminating unit project that required students to display their knowledge and understanding of the material covered in their choice of medium. The unit in English was for *Catcher in the Rye*, while the theatre class used a multiple intelligence final exam.

The final intervention employed by the researchers involved the use of transfer techniques. In English class, the teacher instructed students on reading strategies that they could also use in other content areas. Next, the teacher presented journal questions to students requiring them to apply what they had read to their own lives. Last, students used KWLs to transfer knowledge from one subject area to another. In theatre class, students also used KWLs to show a relationship between knowledge learned in other classes to knowledge of theatre, interdisciplinary units were developed to integrate history and other fine arts, and students did improvisations based on "real life" topics pertinent to students' daily lives.

Presentation and Analysis of Results

In order to assess the affect of critical thinking, a pre/posttest of the Cornell Critical Thinking Test Level X was given, and the results of each were compared to analyze the effectiveness of the given interventions (see Table 2).

Table 2

Comparison of Pre/Posttest Results for Cornell Critical Thinking Test Level X

	Mean	Median	Mode
	Pretest Posttest	Pretest Posttest	Pretest Posttest
Site A	23.41 20.86	24 21	25 21
Site B	21.43 17.29	22 16	24 16

Note. The values represent correct responses out of a possible 40 questions.

According to the data, the intervention does not appear to have been very successful. At Site A, the average score went from 58.525% correct responses to 52.15% correct responses; whereas, the average score by students at Site B went from 53.575% correct responses to 43.225% correct responses. This data suggest to the researchers that students did not increase their level of critical thinking. This test was recognized by the students to be nongraded, therefore, they were not invested in doing their best.

Implications of Intervention Results

Due to the difficulty in obtaining meaningful post-intervention data, the researchers decided to rely upon teacher observation to assess the effectiveness of the individual strategies. This section will document the results garnered from these observations.

Observations of the teacher/student read aloud strategy suggest successful implementation and student improvement in the use of critical thinking. Both researchers were pleased to note improvement in student comprehension and assignment completion. This was especially true when looking at students who fall in the lower ability level. These students displayed a marked improvement in assignment completion and comprehension of difficult material. One student commented, "I gained a better understanding of characters and storyline because you explained confusing scenes and situations." As the intervention progressed, the researchers also noticed that students became better at clarifying plot development and assignment directions due to their own practice with these skills. Another student even stated, "It has been really helpful for me when you have us repeat directions to you before beginning an assignment." The next intervention, questioning techniques, also suggested improvement in critical thinking.

Socratic questioning was the first technique adopted into the researchers teaching repertoire. Researcher 2 found this technique most useful in the classroom environment. Students seemed more apt to search for their own understanding, instead of relying on the teacher for the "answers." This was especially true when students doubted their own abilities and understanding of assignment directions. Researcher 1 found this technique useful as well; however, this skill did take some practice in order to become proficient. Once the teacher gained confidence and familiarity with the structure, this technique proved to be beneficial. Both researchers noted an increase in the depth of answer completion and content understanding with Socratic questioning.

Open-ended questioning was another technique applied by both researchers. Upon reflection, both agreed that this skill required more practice and repetition from teacher

and students before it became common practice in their classrooms. Upon initial implementation, the researchers detected many blank stares from students. The researchers perceived this reaction to be caused by the lack of student experience in answering these types of questions. It was also difficult for the instructor to develop these questions on the spot; therefore, prior question preparation was essential. However, after 3 weeks of working with this strategy, the researchers became more comfortable in developing and utilizing this technique, and students became more adept at responding to these questions.

The third questioning technique employed by the researchers was the use of wait time. After attempting to implement this strategy, both researchers ruminated on its use and effectiveness. The initial assessment garnered from this reflection was that this process was extremely difficult to implement. Both researchers found it challenging to force themselves to wait the allotted time before calling on students. However, students found it just as difficult. Those who wanted so desperately to be involved and to display their knowledge on the material found it difficult to wait for 30 seconds before the instructors recognized them. Consequently, the researchers were able to alleviate some student anticipation and anxiety when they explained their rationale for using this particular procedure. Yet, some students still disliked the amount of time (30 seconds) "wasted" on waiting for others to think of an answer.

Since so many students found wait time unbearably frustrating, the researchers decided to modify the wait time strategy. The adapted approach required students to write down their answers to questions during the 30-second time frame. The researchers then alternated strategies in order to give students practice with both methods. Although

Researchers 1 and 2 concluded their intervention, they continue to document similar observations and difficulties into the subsequent school year. Therefore, they strive to ameliorate and employ this strategy in their classrooms.

The fourth questioning strategy used by the researchers was the use of fat and skinny questions. This strategy was relatively easy to employ because both researchers realized they use this strategy frequently in their every-day discussions. This strategy was also one that students were able to recognize quickly. However, the one observation noted by both researchers was that students tended to develop more skinny than fat questions when asked to form their own.

Thought-full language was the final strategy applied into both researchers' questioning repertoire. Like wait time, the researchers observed difficulty in implementing this technique. This method required constant reflection by the researchers as they attempted to implement thought-full language into their daily lessons. Unfortunately, they tended to return to comfortable, non-specific questioning terminology unless prior language selection was prepared. Consequently, neither researcher experienced much success in its implementation. However, both recognize the importance of using thought-full language and find themselves achieving more success with this strategy during the subsequent school year than during their intervention.

Next, the researchers found the implementation of graphic organizers successful. The researchers made only a few observations regarding this strategy. First, high school students do not use them enough. During the pre-intervention questionnaires, one teacher noted, "I do not use these in my classroom because I find them to be too juvenile in the application to my content." The researchers also found that students believed that using

graphic organizers was an elementary strategy. However, upon implementing them into the curriculum, students did respond favorably. During the creation of graphic organizers, the researchers observed more positive peer interaction, more depth of understanding, more interesting verbal exchanges in relation to the content, and more laughter. Another observation noted by the researchers was that the visual learners displayed a better understanding of content after placing it into a concrete, graphic format. The only downfall, in regards to this strategy, was the lack of space to display graphic organizers some classrooms afforded to these researchers.

The researchers had both positive and negative observations regarding the use of journals. The first observation the researchers noted was that students were not effective in using metacognition. This was difficult for them at first because it required self-analysis of their thinking process, a task that they rarely perform. Nonetheless, with practice, students displayed proficiency at thinking about their thinking. Students also expressed ideas and feelings in their journals that they would not usually articulate in class discussions. The pre-intervention surveys also documented to the researchers that students were tired of using journals because "so many other teachers use them too." Thus, researchers adopted journal stem bookmarks in order to engage students in the journaling process. Students responded positively to using the bookmarks and commented that, "they were fun and helped me get started when I am stuck." Finally, when reading student journals, the researchers noted that students displayed a deeper understanding of content. Yet, although journals were effective in demonstrating student understanding, the researchers found the assessment of journals to be difficult and time

consuming. They also found it difficult to keep absent students current on missed journal entries.

A favorite intervention of the researchers was the use of multiple intelligence projects and assignments. These assignments, although time-consuming to develop, proved to be worthwhile especially for special education students and lower level language students. The researchers observed that students responded favorably to the use of these projects because they were able to engage in activities that involved their own personal strengths. It also allowed for personal choice and freedom. The researchers attribute this widespread success to the fact that students were engaged in all levels of development, assessment, and reflection.

To conclude, the researchers noted some observations regarding the implementation of transfer techniques. In English class, Researcher 1 implemented reading strategies to aid students in reading comprehension of texts in other content areas. Students did comment that the use of these strategies proved to be beneficial when studying for a science or social studies test. However, not all students observed displayed a proficient use of these strategies in the English classroom. Those who did not utilize the strategy stated, "I hate taking notes. I'm not good at picking out the important stuff." This demonstrates to the researchers that students need more practice in using some of these strategies.

The other observation in regard to transfer techniques was that students displayed excitement and surprising depth of understanding when applying other subjects to theatre and English classes. Both researchers acquired numerous examples of students sharing relevant information obtained from other content areas. At times, students placed the

researchers into the role of learner when student contributions surpassed teacher depth of understanding. Interestingly, Researchers 1 and 2 noted that most students do not even realize the amount of information they transfer from other content areas. The final encouraging observation noted by both researchers was that students do display a desire to understand and learn outside a given subject or content area. Researchers 1 and 2 documented students' desire to learn through the inquisitive questions they asked in regard to material covered.

The researchers also observed implications regarding the Cornell Critical Thinking Test through student journals. Some students responded: "I think the test was odd because it didn't tell or teach us anything," "I personally think the critical thinking test was dumb," "I have no idea how the test measured our critical thinking skills. It was just a very, very, unrealistic story," and "I think this test was bogus because it had nothing to do with this class or any of my other classes. So how can they tell if I can think critically or not?" These comments support the beliefs of the researchers that this test was not an effective or appropriate tool to measure critical thinking for the intervention. Both researchers attribute the poor findings to the following reasons: (1) the researchers administered the posttest within the last week of school; therefore, students were apathetic and had "checked out" for the year; (2) students realized the test results would not be reflected in their grades; and (3) the test made no connection to material taught in class. Thus, these three causes resulted in a negative outcome from pre- to post-intervention data.

A further implication of the data, observed by both researchers, suggest a connection between motivation and critical thinking. To begin, the researchers observed a

predominant trend while implementing the strategies to improve critical thinking. The first sign began during the pre-intervention assessment when students were asked to complete the Cornell Critical Thinking Test Level X (Ennis & Millman, 1985). After the researchers distributed the test, hands went up and one student asked, "Are we going to get a grade for this?" When the researchers responded that the test would be used for pre-intervention data, some students did not want to complete the test. One student even sat and filled in bubbles randomly without even opening the test booklet. This strongly suggests to the researchers that there is a considerable relationship between motivation and critical thinking. This attitude revealed itself numerous times during the course of the intervention when students did not complete questionnaires, tests or projects because there was no grade attached to the assignment.

The researchers also acknowledge that a cultural locus exists as a potential connection between motivation and critical thinking. When trying to analyze why students lack self-motivation and the drive to think critically, one must consider how society influences students and education. Through the invention of devices like the microwave, remote control, washer, dryer, and computer, the populace has been propelled into a society that desires quick and easy solutions and immediate gratification. Thus, the schools are reflecting a student population that possesses a poor work ethic. Teachers are observing students who want to take the path of least resistance. They possess a "What will you give me if I do this?" attitude, or they seek to complete an assignment by doing the least amount of work possible. Unfortunately, these attitudes inhibit the process of critical thinking pedagogy.

Another implication of cultural influence involves the placement of the responsibility of education. Current society is placing the burden of education solely on the shoulders of the school and teachers because more and more parents are unable to spend quality time at home. This is due in part to the desire to acquire more material possessions and lifestyle choices made by families, combined with an increase in the number of single-parent households. Consequently, parents are unable to aid/monitor students in homework completion and progress. Society is also experiencing an influx of immigrant families who do not speak English; therefore, these parents, although willing, may be unable to assist their children with assignments. Finally, one must acknowledge that some parents do not possess the level of education required by some subjects in order to assist their children properly. Hence, teachers are required to provide the education in the classroom as well as the assistance and tutoring outside the class.

The last inference regarding cultural influence as a potential link between motivation and critical thinking involves student need for stimulation and immediate gratification. Television, movies, arcade games, and home video games bombard students with a multitude of stimuli on a daily basis. These stimuli provide students with a fun, fast-paced, mode of immediate gratification. As a result, they desire the same outcome from the classroom. They are predisposed to the attitude of "If it is not fun, I do not want to do it." Thus, there is a distinct barrier between work and fun.

The implication of these societal values is that today's culture does not know how to reflect, self-assess, and wait. Consequently, schools today are merely reflecting these chronic societal issues and concerns. The ramifications of such a society imply a bleak future for education if these values continue.

The final implications regarding the research involve the educational structure and teacher preparation. In the pre-intervention surveys, many teachers stated they did not feel properly trained to implement critical thinking into their classrooms. Additionally, many stated that despite the fact that a plethora of research on critical thinking exists, they lack the time necessary to investigate and apply these suggestions in the classroom. Furthermore, some respondents stated they did not want to try new techniques of instruction or assessment for fear that it may have negative repercussions on their evaluations if they were unsuccessful in its implementation. Thus, these educators are still using antiquated methods of instruction and assessment. One such method of instruction these educators rely upon is the use of lecture in the classroom. The researchers also theorize that this resistance to implement critical thinking activities into lessons is due, in part, to administrative pressure on teachers to cover content. This teaching style also affects teachers' use of varied assessment tools in the classroom, since objective tests lend themselves better to lecture method and memorization of materials.

Finally, the researchers believe teachers tend to encourage competition among students by focusing on and promoting the achievement of "good grades." The result is a grade-seeking student focused on the memorization of facts instead of a knowledge-seeking student focused on the development of thinking skills. Thus, the researchers imply that the educational structure, in effect in many classrooms, is one that continues to hinder the development of critical thinking in today's youth.

Conclusions and Recommendations

Based on the presentation and analysis of the data on critical thinking in the high school classroom, the researchers can draw no conclusion as to the effectiveness of the

intervention. Both researchers believe there are many reasons for the lack of positive results documented in the intervention.

The first conclusion drawn by the researchers is that the implementation of critical thinking is not a process that is easily measured. Although the researchers obtained positive observations during the intervention, these were not "measurable" in standardized test format. In addition, the pre-intervention surveys were not applicable for post-intervention data acquisition. Thus, the researchers lacked sufficient data comparison in order to make a definitive assessment on the growth of students' critical thinking. Therefore, the first recommendation is that other researchers develop better methods of assessing critical thinking in order to obtain a more distinct conclusion based on measurable data.

The next conclusion by the researchers is that the use of the Cornell Critical Thinking Test was ineffective. There are several potential causes for why this was an ineffective tool. The researchers believe that this was not effective because there was no connection to the material or the curriculum in which it was used. Researchers 1 and 2 theorize that students did not perform well because the test included an arbitrary story that did not have any connections to class or real-life situations. The researchers also conclude that students lack intrinsic motivation to perform well. Since there was no grade attached to the test, few students assigned value to the test. Instead, they saw it as another mundane task to complete with little or no thought involved. Finally, due to time constraints, the researchers had no options but to administer the posttest during the last week of school. This proved ineffective because many students had already "checked out" for the year and did not want to "waste time" with another test. Thus, the following

recommendations can be made: (a) if a standardized test is to be used, then it should pertain to the content of the class in which the intervention is attempted, (b) if critical thinking is to be enhanced, then it would be more effective to do an implementation that combines both motivation and critical thinking, and (c) if a posttest is to be given, then it should be given to students prior to the last days of the school year.

Another conclusion reached by the researchers is there are a number of factors that are out of the teachers' control when it comes to implementing and improving critical thinking. First, both researchers concur that a cultural locus exists that undermines critical thinking. Due to societal values concerning motivation and work ethic, teachers struggle to impart the importance of being able to think critically and work hard to achieve success in school and life. Second, the researchers acknowledge that there is a lack of teacher preparation and staff development on the implementation and instruction of critical thinking. Thus, how are teachers supposed to use these methods in the classroom if they are not cognizant that these methods exist, and if they are not critical thinkers themselves? Last, the educational structure still hinders the critical thinking process because it stresses the importance of achievement in standardized tests as well as the importance of competition and grades. Therefore, in order for critical thinking to reach fruition, administrators and teachers need to evaluate and change the educational structure in order to include critical thinking as an essential component of the educational process.

The last conclusion made by both researchers is that implementing critical thinking is a learning process for the teacher as well as the students. Both researchers found it difficult to master the techniques needed to teach critical thinking during the

intervention. However, like all skills, the more one practices, the better one becomes. Thus, the researchers find that they are implementing the strategies to improve critical thinking more successfully during the subsequent year after the implementation of the interventions. Therefore, the recommendation by both researchers is that one needs to have patience and perseverance in order to make critical thinking pedagogy an essential aspect of one's teaching repertoire. Remember, 'Rome was not built in one day', neither are one's skills in teaching critical thinking.

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Appendices

Appendix A

Faculty Survey #1

Directions: Please respond to each of the following statements by circling the correct response that most accurately reflects your behavior. **On the reverse side, please add any examples of how you teach or incorporate critical thinking skills in your content area.**

1. I ask students to "think out loud."
Daily Often Sometimes Never
2. I ask students to think about the processes they take to arrive at a decision or answer.
Daily Often Sometimes Never
3. I use learning logs/journals in my classroom.
Daily Often Sometimes Never
4. I don't mind sharing with students how I tackle a problem.
Daily Often Sometimes Never
5. I make use of graphic organizers to present material/problems/strategies.
Daily Often Sometimes Never
6. I require students to do some kind of writing along with a reading assignment.
Daily Often Sometimes Never
7. I ask students to apply what they are learning to "real life" situations.
Daily Often Sometimes Never
8. I give 10-30 seconds of "think time" whenever asking difficult questions in class.
Daily Often Sometimes Never
9. I make use of Socratic questioning in class.
Daily Often Sometimes Never
10. I call on all students in class, not just individuals who raise their hands.
Daily Often Sometimes Never
11. I share the rationale/objectives of lessons/projects with students
Daily Often Sometimes Never
12. I hold open class discussions.
Daily Often Sometimes Never
13. When I don't know an answer in class, I "think out loud" when figuring it out.
Daily Often Sometimes Never
14. I see my role as a facilitator of student learning.
Daily Often Sometimes Never
15. I teach students strategies for reading and understanding what they have read from the textbook or printed course material.
Daily Often Sometimes Never
16. I specifically teach thinking skills in my course.
Daily Often Sometimes Never
17. I feel adequately prepared to teach thinking skills.
Strongly Agree Agree Disagree Strongly Disagree

Appendix B

School-Wide Student Survey

Directions: Please respond to each of the following statements by circling the correct response that most accurately reflects your teachers' behaviors

1. Teachers ask students to "think out loud."

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
2. Teachers ask students to think about the processes that they take to arrive at a decision or answer.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
3. Teachers have students use learning logs/journals in the classroom.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
4. Teachers share with students how they tackle a problem.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
5. Teachers make use of graphic organizers to present material/problems/strategies.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
6. Teachers require students to do some kind of writing along with a reading assignment.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
7. Teachers ask students to apply what they are learning to "real life" situations.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
8. Teachers give 10-30 seconds of "think time" whenever asking difficult questions in class.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
9. Teachers call on all students in class, not just individuals who raise their hands.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
10. Teachers share the rationale/objectives of lessons/projects with students

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
11. Teachers hold open class discussions.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
12. When teachers don't know an answer in class, they "think out loud" when figuring it out.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
13. Teachers are responsible for students learning.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
14. Teachers teach students on strategies for reading and understanding what they have read from the textbook or printed course material.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------
15. Teachers teach thinking skills as part of the course content.

Daily	Often	Sometimes	Never
-------	-------	-----------	-------

Appendix C
Faculty Survey #2

Directions: Please respond to each of the following statements by circling the response that most accurately reflects the behavior of your students.

- | | | | | |
|---|-------|-----------|--------|-------|
| 1. Students give up quickly when asked to solve a challenging problem or when asked a difficult question. | Often | Sometimes | Rarely | Never |
| 2. During class discussions, students, without thinking, blurt out the first answer that comes to mind. | Often | Sometimes | Rarely | Never |
| 3. Students listen to others with empathy and understanding. | Often | Sometimes | Rarely | Never |
| 4. Students are open-minded and able to consider alternative points of view. | Often | Sometimes | Rarely | Never |
| 5. Students reflect on and evaluate their learning. | Often | Sometimes | Rarely | Never |
| 6. Students check for accuracy and precision in written work before turning in the finished product. | Often | Sometimes | Rarely | Never |
| 7. Students ask well thought-out questions. | Often | Sometimes | Rarely | Never |
| 8. Students are able to apply school-learned knowledge to real-life situations. | Often | Sometimes | Rarely | Never |
| 9. Students use confused, vague, or imprecise vocabulary and language. | Often | Sometimes | Rarely | Never |
| 10. Students use cooperative group time effectively. | Often | Sometimes | Rarely | Never |
| 11. Students use prior knowledge and experiences to help solve new problems. | Often | Sometimes | Rarely | Never |
| 12. Students apply knowledge learned in one content area to material in other content areas. | Often | Sometimes | Rarely | Never |
| 13. Students go above and beyond the necessary requirements when completing an assignment. | Often | Sometimes | Rarely | Never |
| 14. Students use class time wisely. | Often | Sometimes | Rarely | Never |
| 15. Students willingly take notes on material being covered in class. | Often | Sometimes | Rarely | Never |

Appendix D
Student Questionnaire

Directions: Please respond to each of the following statements by circling the correct response that most accurately reflects your behavior.

1. I "talk to myself" (silently or out loud) when tackling a problem I'm not sure about.
Always Sometimes Never
2. When I'm frustrated or confused, I ask myself "why."
Always Sometimes Never
3. Writing out ideas helps to clarify them.
Always Sometimes Never
4. When I'm not sure of an answer on a multiple-choice test, I guess randomly and move on.
Always Sometimes Never
5. I use graphic organizers when studying
Always Sometimes Never
6. When I try to solve a difficult or confusing problem, it is necessary for me to get ideas from all members of my group.
Always Sometimes Never
7. I can see connections between what I learn in one class to what I learn in another class.
Always Sometimes Never
8. I can best think of an answer to a verbal question in class when given 10-30 seconds of "think time" before answering.
Always Sometimes Never
9. When I don't know an answer, I immediately ask someone else.
Always Sometimes Never
10. When I am not sure of an answer on a multiple choice test, I guess randomly and move on.
Always Sometimes Never
11. I find class discussion helpful.
Always Sometimes Never
12. I can see connections between things I learned earlier in a course and things learned later in the same course.
Always Sometimes Never
13. It is the teacher's responsibility to make sure I learn.
Always Sometimes Never
14. I use my notes or textbook when studying.
Always Sometimes Never
15. I see the teacher as being responsible for helping me learn.
Always Sometimes Never
16. When I am not sure of an answer on a multiple-choice test, I try to eliminate some of the possible answers before guessing.
Always Sometimes Never

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Appendix E Parent Survey

Directions: Please respond to each of the following statements by circling your most accurate response.

- | | | | | |
|--|--------|-------|-----------|-------|
| 1. My son/daughter studies in a quiet area. | Always | Often | Sometimes | Never |
| 2. There is a TV/stereo in the area where my son/daughter studies. | Always | Often | Sometimes | Never |
| 3. A TV/stereo is on in the area where my son/daughter studies. | Always | Often | Sometimes | Never |
| 4. There is a desk in the room where my son/daughter studies. | Always | Often | Sometimes | Never |
| 5. There is a telephone in the room where my son/daughter studies. | Always | Often | Sometimes | Never |
| 6. My son/daughter makes or accepts phone calls while he/she is studying. | Always | Often | Sometimes | Never |
| 7. My son/daughter uses the desk when studying. | Always | Often | Sometimes | Never |
| 8. My son/daughter asks me for help when doing his/her homework. | Always | Often | Sometimes | Never |
| 9. I ask my son/daughter questions regarding his/her homework. | Always | Often | Sometimes | Never |
| 10. I feel confident in helping my son/daughter with his/her homework. | Always | Often | Sometimes | Never |
| 11. I ask to see my son/daughter's homework when it is completed. | Always | Often | Sometimes | Never |
| 12. My son/daughter utilizes a discussion group to study. | Always | Often | Sometimes | Never |
| 13. My son/daughter brings homework home to complete. | Always | Often | Sometimes | Never |
| 14. My son/daughter studies from his/her notes or textbook before a test. | Always | Often | Sometimes | Never |
| 15. My son/daughter gets easily frustrated and gives up on his/her homework. | Always | Often | Sometimes | Never |

Appendix F
Cornell Critical Thinking Test Level X

CORNELL CRITICAL THINKING TEST

LEVEL X

EXPLORING IN NICOMA

The year is 2001. It is the middle of June. Imagine yourself to be in the second group from Earth to land on the newly discovered planet Nicoma. Nothing has been heard from the first group, which landed on Nicoma two years earlier. Your group has been sent to make a report about what happened to the first group.

In this booklet, you will be told about some things learned on Nicoma by your group. Then you will be given problems that call for clear thinking. Answer these problems as if the things you are told are true.

Do not guess wildly at any answer. If you have no idea what the answer is, leave a blank. If you have a good idea, even though you are not positive, answer the problem.

The test has four parts. In the first two parts you must not go back to a problem once you have passed it.

Now wait until you are asked to begin.

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SECTION I

WHAT HAPPENED TO THE FIRST GROUP?

The first job of your group is to find out what happened to the first group of explorers. Your group has landed on Nicoma and has just discovered the metal huts put up by the first group. From the outside, the huts appear to be in good condition. It is a warm day, and the sun is shining. The trees, rocks, grass, and birds make Nicoma appear like much of North America.

You and the health officer are the first to arrive at the group of huts. You call out, but get no answer.

The health officer suggests, "*Maybe they're all dead.*" You try to find out if he is right.

Listed below are some facts you learn. You must decide whether each fact supports the health officer's idea, or suggests that the health officer's idea is mistaken—or neither.

For each fact, mark one of the following on your answer sheet:

- A. This fact supports the health officer's idea that everyone in the first group is dead.
- B. This fact goes against the health officer's idea.
- C. Neither: this fact does not help us decide.

Here is an example of the kind of problem in this part of the test:

1. You go into the first hut. Everything is covered by a thick layer of dust.

Is this fact **for** or **against** the health officer's idea, or **neither**? It certainly isn't enough to prove him right, but it does give **some** support. If a fact supports the health officer's idea, you should mark **A** on your answer sheet. Mark **A** for Number 1.

Mark your answer for this next example:

2. Other members of your group discover the first group's rocket ship nearby.

The answer is **C**. Knowing that the first group's rocket ship has been discovered doesn't help you decide one way or the other. Since this fact doesn't help you decide whether the health officer is right, **C** is correct.

GO ON TO THE NEXT PAGE.

CORNELL CRITICAL THINKING TEST

LEVEL X

Here is a list of facts. For each one mark A, B, or C. If you have no idea which to mark, leave a blank and go on to the next one. Consider each fact in the order in which it is numbered. Work carefully, and do not return to a problem once you have passed it.

Reminder—mark as follows:

- A. This fact supports the health officer's idea that they are all dead.
 - B. This fact goes against the health officer's idea.
 - C. Neither: this fact does not help us decide.
3. There are ten huts. You go into the second hut and again find that everything is covered by a thick layer of dust.
 4. You go into the third hut. There is no dust on the cookstove.
 5. You find a can opener by the cookstove in the third hut.
 6. In the third hut you find the daily record of a member of the first group. It is written by a man named John Stilltron. The date of the last entry, July 2, 1999, is one month after the arrival of the first group.
 7. You find that the two beds in the third hut are covered with a thick layer of dust.
 8. You read the first entry in Stilltron's record: "June 2, 1999. We arrived today after a tiring trip. We put up the huts near our landing place."
 9. You read the second entry in Stilltron's record: "June 3, 1999. There is a plentiful supply of food. Ducks, squirrels, and deer are here and are easily caught."
 10. You read the third entry in Stilltron's record: "June 4, 1999. The water in the nearby stream has been tested by our health official. He says it is safe to drink. We are not drinking it yet. We're going to try it with some guinea pigs we brought from earth."
 11. You read the last entry in the book: "July 2, 1999. I am getting weaker and can't hold out much longer."
 12. In different but shaky handwriting below the last entry, you read, "John Stilltron died the same day."
 13. The health officer has now looked in each of the ten huts. He reports that there is a thick layer of dust in each of them.
 14. You examine the beds in each of the first three huts. You find that in each case the blankets and sheets are stripped from the beds and folded neatly in the closets.

GO ON TO THE NEXT PAGE.
DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder—mark as follows:

- A. This fact **supports** the health officer's idea that they are all dead.
 - B. This fact **goes against** the health officer's idea.
 - C. **Neither**: this fact does not help us decide.
15. The health officer reports that the beds in all the other huts are in the same condition. The blankets and sheets are neatly folded in the closets.
 16. You notice a mound of earth behind Stilltron's hut. You examine it and find a stone with these words on it: "John Stilltron. July 2, 1999. He died as he lived—with honor."
 17. The first group's truck is missing.
 18. In the tenth hut you find a note dated March 15, 2001:
If anyone should come looking for us, we have all gone exploring in the truck. We plan to head in the direction of the sunrise. (Signed) Captain Sardus, Leader of the Nicoma Explorers.
 19. You see a note added at the bottom:
P.S. We plan to be back within a week.
 20. Eight members of your group get in one of your group's trucks and head in the direction of the sunrise. You follow a rough broad valley for 20 miles and find the first group's truck by a stream. The truck looks abandoned.
 21. You find a note in the driver's seat:
Engine breakdown. We plan to hike downstream. Perhaps there's a large body of water in that direction. (Signed) Captain Sardus.
 22. One of the eight, who is a mechanic, examines the truck's engine. He says that it is in bad condition.
 23. You notice that the truck's front tires are flat.
 24. You start to drive downstream, since the land is level and clear. After 10 miles of driving, you see smoke rising in the distance. As far as you know, there are no volcanoes on Nicoma.
 25. You soon come to a cliff too steep for the truck. So all eight of you get out and walk toward the smoke.

DO NOT GO ON TO THE NEXT PART, UNLESS TOLD TO DO SO. DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

SECTION II

EXAMINING THE VILLAGE ON NICOMA

It grows dark, so you camp overnight. You set out again in the morning. After walking for an hour, your party comes upon a village of stone huts. The village is empty. The sun is shining brightly. Reports are brought to you by other members, since you are the leader of the party.

You will be given the reports two at a time. Read both and then decide which, if either, is more believable.

If you think the first is more believable, mark A on your answer sheet.

If you think the second is more believable, mark B.

If you think the two are equally believable, mark C.

Here is an example (for each problem, the statements to decide about are underlined):

26. A. The auto mechanic investigates the stream by the village and reports, "The water is not safe to drink."
 B. The health officer says, "We can't tell yet if the water is safe to drink."
 C. A and B are equally believable.

Mark an answer. The correct answer is B. The health officer should know more about whether the water is safe to drink than the mechanic.

Here are some more pairs. Consider each pair in the order it is given. Do not go back to a problem once you have passed it. Remember to decide only about the statements that are underlined.

27. A. The health officer says, "This water is safe to drink."
 B. Several others are soldiers. One of them says, "This water supply is not safe."
 C. A and B are equally believable.
28. A. The mechanic says, "The water looks clear."
 B. The health officer, after making tests, says, "The water is safe to drink."
 C. A and B are equally believable.

GO ON TO THE NEXT PAGE.
 DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder:

- If the first statement is more believable, mark A.
 If the second statement is more believable, mark B.
 If the two statements are equally believable, mark C.

29. A. One soldier looks at some smoke rising. The smoke appears to him to be just behind the largest stone hut, which is on a hill about 100 yards away. He says "The smoke comes from a fire about 100 yards away."
 B. Another soldier, who has just been behind the largest stone hut, says, "Oh no, the fire is much farther than that."
 C. A and B are equally believable.
30. A. The mechanic has made a quick round of the stone huts and heard a noise in the nearest hut. "There must be someone in that hut," he reports.
 B. The health officer, who was in the nearest hut for several minutes, reports, "Nobody is in that hut."
 C. A and B are equally believable.
31. A. After examining the nearest hut, the health officer says, "The first group of explorers built that hut."
 B. The anthropologist (someone who studies the way different races and tribes of people live) also examined the nearest stone hut. He states, "The first group probably did not build the hut."
 C. A and B are equally believable.

You take your group to the top of the hill behind the largest stone hut to see if you can tell where the smoke is coming from. In the distance you see a group of about 40 moving figures gathered around a smoky fire.

Your captain has offered a large reward to the person who first sees any one of the missing explorers. You would each like the honor of being the first to see them—if they are there. But at the same time you are careful, because those figures around the fire may be dangerous. There are several pairs of field glasses in the group. The sun is still shining brightly. With field glasses one can count the logs on the fire.

32. A. The mechanic, looking through his field glasses, says, "They are tan-skinned creatures with furry spots."
 B. The anthropologist, looking through his field glasses, says, "They don't have furry spots. They are wearing skins of animals."
 C. A and B are equally believable.

GO ON TO THE NEXT PAGE.

DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

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CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder:

- If the first statement is more believable, mark A.
 If the second statement is more believable, mark B.
 If the two statements are equally believable, mark C.

33. A. The mechanic says, "I think there are 40 of them."
 B. The anthropologist says, "No, I think there are only 37."
 C. A and B are equally believable.
34. A. The anthropologist says excitedly, "That's Captain Sardus there on the left by himself!"
 B. Then the mechanic reports, "That's Sergeant Edema who just stood up on the right."
 C. A and B are equally believable.
35. A. One of the soldiers borrows the anthropologist's glasses and says, "Yes, that's Sergeant Edema."
 B. At the same time, the health officer, who has borrowed the mechanic's glasses, says, "Yes, that's Sergeant Edema."
 C. A and B are equally believable.

Now if the man on the left is Captain Sardus, the reward goes to the anthropologist. If not, it goes to the mechanic.

36. A. The health officer then looks through his field glasses at the one on the left. "That's not Captain Sardus," he says.
 B. The anthropologist, who has his glasses again, replies, "Yes, it is."
 C. A and B are equally believable.

Then the man at the left rejoins the group of figures, and another person takes his place.

37. A. The health officer says, "That new one is not one of the explorers."
 B. The anthropologist agrees, "You're right, he's not."
 C. A and B are equally believable.

GO ON TO THE NEXT PAGE.
 DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder:

- If the first statement is more believable, mark A.
 If the second statement is more believable, mark B.
 If the two statements are equally believable, mark C.

38. A. The anthropologist continues, "And look! There's Captain Sardus facing our way with his hand over his eyes. That's the same person as the one I called Captain Sardus before. I've been following him."
 B. The health officer says, "Yes, that's Captain Sardus facing us now. But he's not the one who was over there on the left. That one is sitting down with his back to us. I've been following him too."
 C. A and B are equally believable.

You ask them to see if they can agree on the number of beings in the group so that you can give an accurate report.

39. A. The health officer has had practice counting large numbers of objects on microscope slides. He announces, "There are exactly 39 figures in that group." He has been using field glasses.
 B. One soldier says, "No, there are 38." He also has been using field glasses.
 C. A and B are equally believable.
40. A. The mechanic takes his glasses back from the health officer and makes a count. "Yes, there are 39 of them," he says.
 B. The soldier repeats, "There are only 38."
 C. A and B are equally believable.

The people around the fire get up and start toward the village. You quickly take your small party to a place on a nearby hill. There you can see the village without being seen. You want to find out whether this is a friendly village, whether the explorers are prisoners, and how many explorers are left. The mechanic writes down what people say they see.

41. A. One soldier counts the people as they move around in the village. He reports, "Only 32 came back from the fire."
 B. Another soldier says, "You must have missed two. I counted as they filed past the big hut, and 34 came back. I don't believe any of them came back another way."
 C. A and B are equally believable.

GO ON TO THE NEXT PAGE.
 DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder:

- If the first statement is more believable, mark A.
 If the second statement is more believable, mark B.
 If the two statements are equally believable, mark C.

42. A. The anthropologist reports, "One of them had on a green hat when they returned from the fire. But he's the only one. I watched them carefully as they went by the big hut."
 B. The health officer says, "There are two with green hats. First I saw one on the left. Later I saw one way over on the right."
 C. A and B are equally believable.
43. A. A soldier says, "Five times in the last minute that one in the green hat has talked to someone and pointed. Immediately that person has run off in the direction he pointed."
 B. "He must be the leader," adds the soldier.
 C. A and B are equally believable.
44. A. "Look, Captain Sardus and two other explorers are coming up to that one in the green hat, who is pointing to the big hut. The one in the green hat is ordering them to go in," the anthropologist says.
 B. "Here comes Sergeant Edema and one other explorer. The one in the green hat is pointing to the big hut. They're going in also," adds the anthropologist.
 C. A and B are equally believable.
45. A. Several more groups of explorers enter the hut. The health officer asks the mechanic, who has been keeping a record, "How many do you think are in there now? I've told you each time one went in. I think there are 13."
 B. The mechanic replies, "According to my record, there are 14."
 C. A and B are equally believable.
46. A. The anthropologist states, "That one with the green hat is going into the hut to the right of the big hut. Three others are following him in."
 B. The health officer says, "Look, here comes another with a green hat. So the one in there is not the leader, since there are two. Let's check the people who go into that hut."
 C. A and B are equally believable.

GO ON TO THE NEXT PAGE.

DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

CORNELL CRITICAL THINKING TEST

LEVEL X

Reminder:

- If the first statement is more believable, mark A.
 If the second statement is more believable, mark B.
 If the two statements are equally believable, mark C.

47. A. The anthropologist has been describing the people as they go in, trying to get some idea of what they might be like. He states, "I saw 18 people go into that hut."
 B. The mechanic disagrees, "According to the record of what you have said, only 17 went in."
 C. A and B are equally believable.
48. A. The anthropologist then looks over to the large hut and says, "Do you see those two men? Perhaps they are guarding the explorers. Oh, look! They're changing positions. The one who is walking stops about 15 feet from the door, and then the one standing by the door walks over to him."
 B. The health officer says, "Yes, I've watched them make ten changes now. But you have the order wrong. The man by the door leaves his post before the one who is walking reaches the place where they meet."
 C. A and B are equally believable.
49. A. The mechanic, who also has been watching says, "I think the health officer is right."
 B. The anthropologist says, "I think he's wrong."
 C. A and B are equally believable.
50. A. One soldier says, "Oh look at the tall man. He has an odd way of walking. He brings his left hand across almost to his right shoulder before his left foot touches the ground."
 B. Another soldier replies, "It is odd. I've been watching him for about five minutes, though, and you have the order backward. He brings his left hand across after his left foot touches the ground."
 C. A and B are equally believable.

DO NOT GO ON TO THE NEXT PART, UNLESS TOLD TO DO SO. DO NOT GO BACK TO CHANGE OR GIVE AN ANSWER.

SECTION III

WHAT CAN BE DONE?

With your party you try to decide whether the villagers are friendly. If not, it may be necessary to rescue the explorers. You try to reason things out.

In each of the problems in this part, you must decide what follows from the reasons given. That is, for each problem, suppose that what the person says is true. Then decide what else would have to be true.

Mark A, B, or C, or leave it blank if you don't know. Consider each problem by itself. In this part, it is all right to go back to a problem after you have passed it. Here is an example:

51. The mechanic says, "If these beings are people from Earth, then they will welcome us. Certainly they are people from Earth."

Which follows?

- A. These beings will not welcome us.
- B. These beings are not from Earth.
- C. These beings will welcome us.

Mark an answer. The correct answer is C. If what the mechanic said is true, then C must also be true. Go on to the rest. There is one best answer for each problem.

52. "If these beings are from Earth, then another space ship must have landed on Nicoma. These beings are definitely people from Earth."

Which follows?

- A. Another space ship has landed on Nicoma.
- B. These beings are not from Earth.
- C. Another space ship has not landed on Nicoma.

53. "If these beings are from Earth, then another space ship must have landed on Nicoma. But no other space ship has landed on Nicoma."

Which follows?

- A. Another space ship has landed on Nicoma.
- B. These beings are not from Earth.
- C. These beings came here by mistake.

GO ON TO THE NEXT PAGE.

CORNELL CRITICAL THINKING TEST

LEVEL X

54. "Whenever lookouts are used, the groups are unfriendly. Those two women are lookouts."

Which follows?

- A. The groups are friendly.
- B. The groups are unfriendly.
- C. If groups are unfriendly, lookouts are used.

55. "All Earth people are able to talk. These are Earth people."

Which follows?

- A. They are able to talk.
- B. They are unable to talk.
- C. If people are able to talk, they are from Earth.

56. "If a group of beings is greeted in a friendly manner, the group will be friendly. This group of beings is not friendly to the explorers."

Which follows?

- A. The explorers greeted them in a friendly manner.
- B. The explorers did not greet them in a friendly manner.
- C. This group of beings was unfriendly before the explorers met them.

57. "If a group from Earth lands on a planet, the landing is announced throughout the world in newspapers. No landing on Nicoma was announced, except for our landing and the landing of our explorers."

Which follows?

- A. If the newspapers announce a landing, then there has been a landing.
- B. The group of beings is from Earth.
- C. The group of beings is not from Earth.

GO ON TO THE NEXT PAGE.

CORNELL CRITICAL THINKING TEST

LEVEL X

58. "A group that is really unfriendly to outsiders will starve them. Our explorers certainly are not starved."

Which follows?

- A. Our explorers are really friendly.
 - B. The group of beings is really unfriendly to our explorers.
 - C. The group of beings is not really unfriendly to our explorers.
59. "This group is friendly to our explorers. If a group is friendly to another group of beings, it will not put them in prison."

Which follows?

- A. Our explorers were not put in prison.
 - B. Our explorers were put in prison.
 - C. Unfriendly groups try to put each other in prison.
60. "There have been only two announcements of landings on Nicoma—our landing and the landing of our explorers. All landings of people from the Earth on other planets are announced in the newspapers of Earth."

Which follows?

- A. The group of beings is not from Earth.
 - B. The group of beings is from Earth.
 - C. The newspapers never make mistakes.
61. "If a group is friendly to another group of beings, it will not put them in prison. A group that is not in prison would be out working on a day like this. Our explorers are not out working."

Which follows?

- A. The group is friendly to our explorers.
- B. Unfriendly groups try to put each other in prison.
- C. The group is unfriendly to our explorers.

GO ON TO THE NEXT PAGE.

CORNELL CRITICAL THINKING TEST

LEVEL X

62. "Look! One of our explorers climbed out a window and started to run away. He stopped running and put his hands up when a sentry aimed a rifle at him and shouted. A friendly group would let its guests leave."

Which follows?

- A. Unfriendly groups put their guests in prison.
- B. This group of beings is very careful.
- C. This group of beings is unfriendly.

63. "If we can talk to our explorers, we can find out for sure if these beings will make peace. We can talk to our explorers by sneaking in the back when the guards change places."

Which follows?

- A. We can find out for sure if these beings will make peace.
- B. We cannot find out for sure if these beings will make peace.
- C. We cannot sneak in the back if the guards are very careful.

64. "If they are from Earth, they are well armed. If they are well armed, they must be taken by surprise. They are from Earth, that is certain."

Which follows?

- A. They are poorly armed.
- B. They can be approached in peace.
- C. We must surprise them.

65. "If we attack them, we will kill some. If we kill some, we will lose information about Nicoma. Now we must not lose any information about Nicoma."

Which follows?

- A. We must attack.
- B. We must kill some of them.
- C. We must not attack.

DO NOT GO ON TO THE NEXT PART, UNLESS TOLD TO DO SO.

SECTION IV

REPORTING BACK AND DECIDING WHAT TO DO

After watching the village for about an hour, you lead your party back to the main camp. You send Sergeant Kowak to report to the captain.

In making his report, he takes certain ideas for granted, without actually saying them. They are part of the basis for his reasoning. Your job is to select ideas that he probably takes for granted in this reasoning. Here is an example:

66. "The explorers can't escape, because they can't break down the walls of the stone hut." Which one of the following is probably taken for granted?
- A. The explorers can jump out the window.
 - B. The guards are alert.
 - C. All ways of escape, except through the walls are impossible.

Mark an answer. The correct answer is C. Among the choices, C helps the reasoning the most.

There is *one best answer* to each of the following. Again, in this part it is all right to return to a question after you have passed it.

67. "Since our explorers are prisoners, we cannot talk to them without being discovered." Which is probably taken for granted?
- A. In general, prisoners cannot be talked to, unless their guards know about it.
 - B. In general, if we talk to people, they will tell others about it.
 - C. In general, if we talk to people, they will not tell others about it.
68. "If we talk reasonably to those beings, they'll release our explorers. After all, those beings are human beings, and the release of our explorers would help humanity." Which is probably taken for granted?
- A. When you talk reasonably to human beings, they will act in a way to help humanity.
 - B. Anything that human beings do is intended to help humanity.
 - C. You have to talk reasonably to human beings in order to get them to do something.

GO ON TO THE NEXT PAGE.

CORNELL CRITICAL THINKING TEST

LEVEL X

69. "The shorter of the two people wearing green hats is a female. I know because I saw her long hair when she removed her hat." Which is probably taken for granted?
- A. All females have long hair.
 - B. Only females have long hair.
 - C. A person wearing a green hat is likely to be a female.
70. "Since about half of the villagers have very short hair, I think that at least half are male." Which is probably taken for granted?
- A. Half are female.
 - B. All males have short hair.
 - C. Only males have short hair.
71. "If at least half of them are men, then in a fight we will have to fight at least half of them." Which is probably taken for granted?
- A. Women are not fighters.
 - B. Men are fighters.
 - C. We cannot beat them all, if they are all fighters.
72. "We need not worry about more than 10 of them at a time, since there are only 10 guns." Which is probably taken for granted?
- A. Guns can hurt us.
 - B. Knives cannot hurt us.
 - C. Only guns can hurt us.
73. "They have only 10 guns. I know because each lookout had one gun and eight guns were stacked in the middle of the village. That's all that could be seen." Which is probably taken for granted?
- A. All the guns they have are in plain sight.
 - B. They do not carry guns under their animal skins.
 - C. Guns are their only weapons.

GO ON TO THE NEXT PAGE.

74. "The villagers did not have any scouts out. This I can tell because we saw none, and we looked carefully." Which is probably taken for granted?
- A. Scouts are used only by people who want somebody to investigate for them.
 - B. Scouts can be seen by people who are alert for them.
 - C. If you see a scout, then that scout has been careless.
75. "The villagers do not know we are here since there are no scouts out." Which is probably taken for granted?
- A. If a group knows that another group which might be unfriendly is nearby, the group will have scouts out.
 - B. If there are scouts out, then the group from which they came knows that another group is nearby.
 - C. If a village sends out scouts, the villagers suspect trouble.
76. "The villagers are not from Earth, because we have not heard of any other landings on Nicoma by people from Earth." Which is probably taken for granted?
- A. All landings on planets are announced.
 - B. All landings by Earth people on planets are announced to other explorers from Earth.
 - C. Explorers from Earth do not hear of landings by explorers from other planets.

END OF THE TEST. If you have time, you may go back and check over your answers, but only in the last two parts (problems 51 through 76).

Here's the rest of the story: The explorers decided to send a party to see whether the villagers would release the first group without a fight. But they also prepared for an attack, in case one should be necessary. Fortunately, the villagers agreed to release the first group. When they learned that the explorers meant no harm, they were happy to release them. In fact, they were glad to have met people from a friendly planet.

Appendix G

Journal Stem Bookmarks



I learned that...
 I wonder...
 My favorite part was...
 I didn't like...
 I liked...
 I wish...
 It surprised me when...
 I noticed...
 I understood....
 I didn't understand...
 I was confused when...
 I hope that...
 I believe that...
 I predict...



I learned that...
 I wonder...
 My favorite part was...
 I didn't like...
 I liked...
 I wish...
 It surprised me when...
 I noticed...
 I understood....
 I didn't understand...
 I was confused when...
 I hope that...
 I believe that...
 I predict...



I learned that...
 I wonder...
 My favorite part was...
 I didn't like...
 I liked...
 I wish...
 It surprised me when...
 I noticed...
 I understood....
 I didn't understand...
 I was confused when...
 I hope that...
 I believe that...
 I predict...



I learned that...
 I wonder...
 My favorite part was...
 I didn't like...
 I liked...
 I wish...
 It surprised me when...
 I noticed...
 I understood....
 I didn't understand...
 I was confused when...
 I hope that...
 I believe that...
 I predict...



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 I didn't understand...
 I was confused when...
 I hope that...
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I learned that...
 I wonder...
 My favorite part was...
 I didn't like...
 I liked...
 I wish...
 It surprised me when...
 I noticed...
 I understood....
 I didn't understand...
 I was confused when...
 I hope that...
 I believe that...
 I predict...

Appendix H
Socratic Questioning

1. What can you say in defense of that view?
2. Why do you agree or disagree with that point?
3. Could you clarify that comment?
4. What reasons do you have for saying that?
5. What did you find interesting?
6. Why do you believe...?
7. How do you know?
8. Why did you find that interesting?
9. Are you sure you are not contradicting yourself?
10. What alternatives are there?

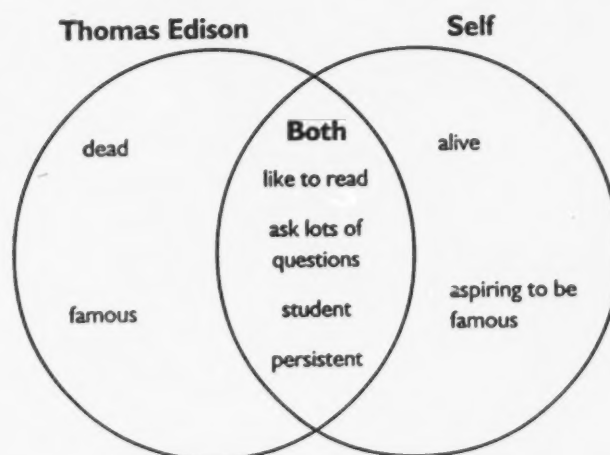
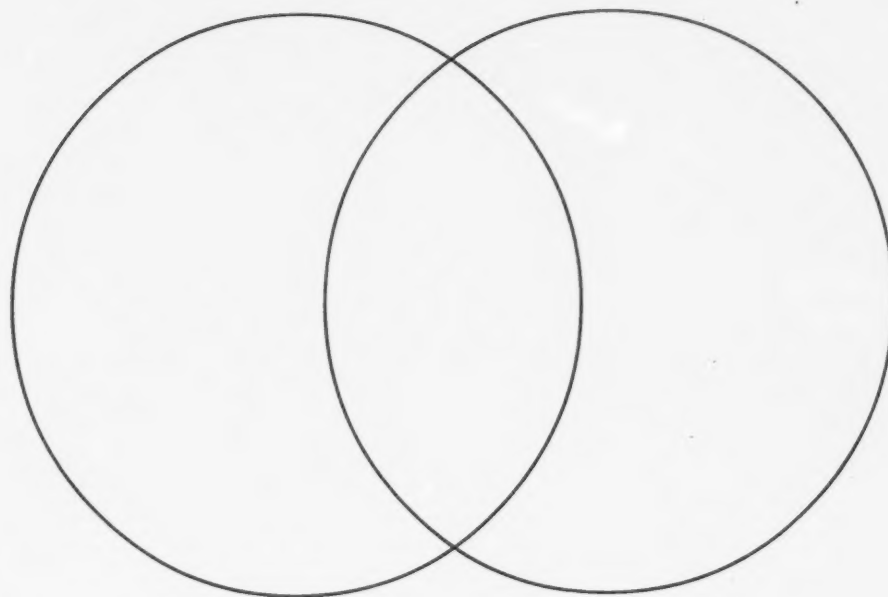
Appendix I
T-Chart Blackline Master

T-CHART
Thinking Skill: Visualizing

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Appendix J
Venn Diagram Blackline Master

VENN

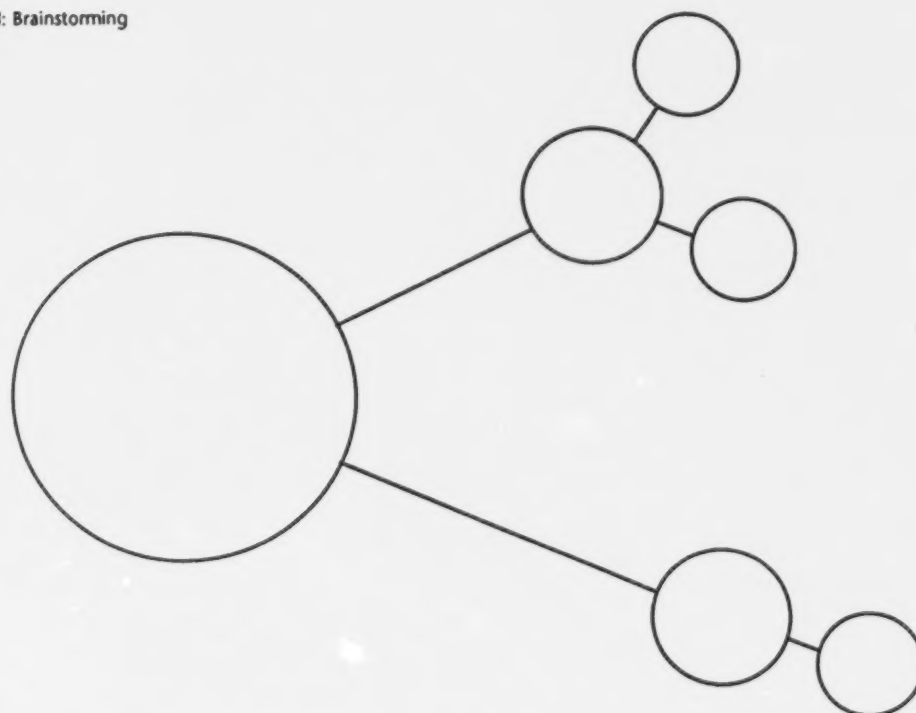


From this, students can extrapolate an essay that compares likenesses and contrasts differences.

Appendix K
Mind Map Blackline Master

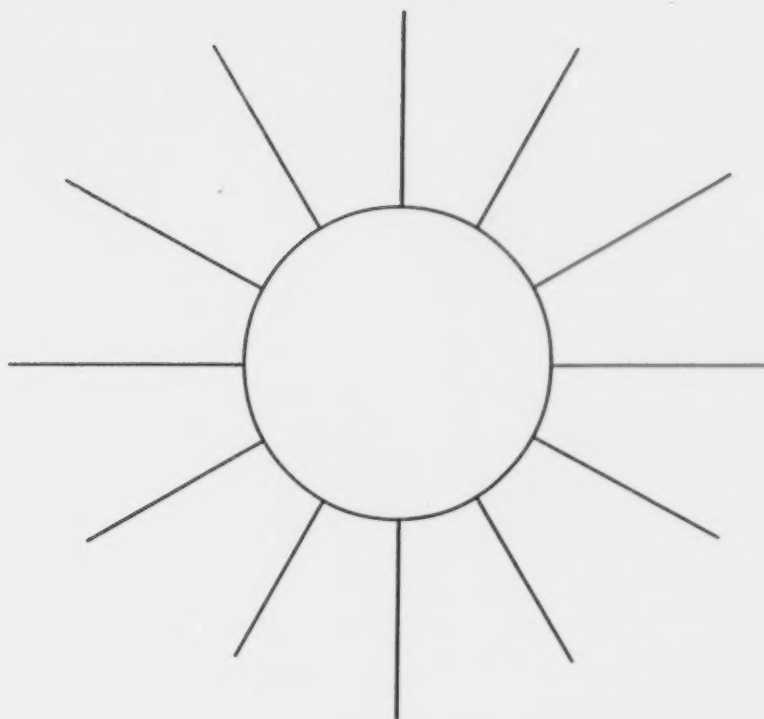
MIND MAP

Thinking Skill: Brainstorming

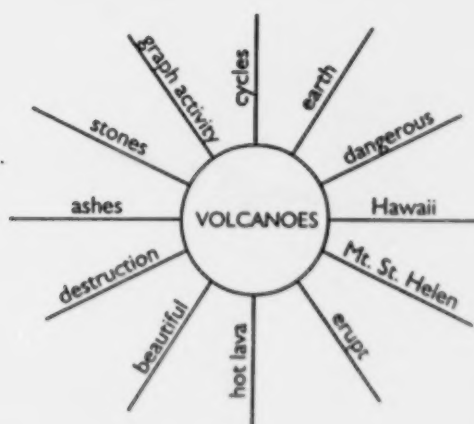


Appendix L
Web Blackline Master

WEB



Subject: Volcanoes



Appendix M
PMI Blackline Master

PMI

Plus / Minus / Intriguing	
P₍₊₎ Plus	
M₍₋₎ Minus	
I_(?) Intriguing	

Appendix N
KWL Blackline Master

KWL

Strategy Sheet		
What We K now	What We W ant to Find Out	What We Have L earned

Appendix O
Metacognitive Journal Blackline Master

Metacognitive Reflections

Name: _____
Topic: _____

Date: _____
Period: _____

Circle One: Lecture Discussion Video Novel

1. Key Ideas:

2. Questions I have:

3. Connections I can make with other subjects:

4. How can I apply these ideas to my life:

5. My insights or reflections from these ideas:

Appendix P
Journal Stems Blackline Master

Journal Stems

Student:

Date:

Topic:

Period:

Directions: Select two or three of the following stems to use in your journal entry. Be sure to use complete sentences and proper grammar.

Stem Statements

- | | |
|--|---------------------|
| A. I am concerned about... | H. The best part... |
| B. Why... | I. I predict... |
| C. I wonder... | J. I believe... |
| D. I feel... if only... | K. |
| E. This reminds me of... | L. |
| F. This connects to my life because... | M. |
| G. What... | N. |

Journal Entry:

Appendix Q
Self-Assessment Questions

1. How well did your group work on each question? (Scale of 1-5 with 5 being high)

2. How well did you contribute to your group? (Scale of 1-5 with 5 being high)

3. Do you feel you learned anything beneficial from this activity? Describe.

4. What could be done to make this a better activity?

5. Is this activity one you would like to do again with another unit?

6. Group grade: _____

Individual Grade: _____

Appendix R
Student Sample of Self-Assessment

1. How well did your group work on each question? 5
2. How well did you contribute to your group? 5
3. Yes, I believe this activity was very beneficial & effective. We learned a lot on how to work together, and to use critical thinking to ten challenging questions. It was effective because we learned some very valuable lessons on how we really think.
4. I don't think anything could be done to make it better, it was perfect as it is.
5. Yes, I would like to do this again because it really made me think of real life situations related to a book which gives you a better understanding of what the characters are thinking.

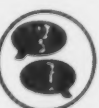
Group: A

Me: A

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Appendix S
Multiple Intelligence Project Information

PROJECTS AND PERFORMANCES CLASSIFIED BY MULTIPLE INTELLIGENCES

 VERBAL/LINGUISTIC Speeches Debates Story Telling Reports Crosswords Newspapers Internet Research Biographies Autobiographies List of books read Annotated bibliographies	 LOGICAL/MATHEMATICAL Puzzles Outlines Timelines Analogies Patterns Problem-solving Lab experiments Formulas Abstract symbols Timelines Venn diagrams Mind maps Computer games	 VISUAL/SPATIAL Artwork Photographs Math manipulatives Graphic organizers Posters, charts Illustrations Cartoons Props for plays Use of overhead, blackboard Story boards Videotapes Murals Sculptures Models	 BODILY/KINESTHETIC Field trips Role playing Learning centers Labs Sports/games Cooperative learning Body language Experiments Interviews Pantomiming Presentations Dances Aerobics
 MUSICAL/RHYTHMIC Background music Songs about books, people, countries, historic events Raps Jingles Lyric poems Choral reading Tone patterns Trios/quartet Choirs Cheers	 INTERPERSONAL Group video, film, slides Team computer programs Think-pair-share Cooperative tasks Jigsaws Wrap arounds Electronic mail Class discussions Conversations Interviews Conferences	 INTRAPERSONAL Reflective journals Learning logs Goal-setting journals Divided journals Metacognitive reflections Independent reading Silent reflection time Self-evaluation Poetry writing Meditations Concentration exercises Diaries	 NATURALIST Outdoor education Environmental studies Field trips (farm, zoo) Bird watching Nature walk Weather forecasting Star gazing Exploring nature Ecology studies Identifying leaves and rocks

Teachers can use this list of projects and performances to help generate meaningful performance tasks and authentic assessments. These will help them evaluate whether students are achieving the major goals of the unit. By verifying the whole-class activities and by allowing students to select their group or individual projects, teachers will better meet the individual needs and interests of their students. The following unit shows how teachers can use a grid to plan effective units.

Appendix S
Multiple Intelligence Project Information

ON YOUR OWN

UNIT PLAN USING MULTIPLE INTELLIGENCES GRID

Unit: _____ Grade Level: _____

Subject Area: _____ Timeline: _____

Major Goals of Unit: 1. _____
2. _____
3. _____

List at least five learning experiences/assessments under each intelligence.

VERBAL/LINGUISTIC	LOGICAL/MATHEMATICAL	VISUAL/SPATIAL	BODILY/KINESTHETIC
			
MUSICAL/RHYTHMIC	INTERPERSONAL	INTRAPERSONAL	NATURALIST
			
1. Whole-class learning experiences:			
2. Whole-class assessments for learning experiences:			
3. Culminating event for unit:			

Appendix S
Multiple Intelligence Project Information

Catcher In The Rye
Multiple Intelligence Unit Project

<u>Musical/Rhythmical</u> • Write a song for a character in the novel • Write a song/rap about <i>Catcher in the Rye</i> • Read a chapter from the book using appropriate music for the incidents that occur. Include annotated justifications for your selections • Select 3-4 songs to include on a <i>Catcher</i> soundtrack. They must fit with scenes and themes of the novel. Include annotations of why you selected each song. Refer to "feel," "tone," and "energy."	<u>Logical/Mathematical</u> • Create a detailed timeline of the story • C/C Mark David Chapman and Holden Caulfield • Select 6 scenes from the book for cartoon expression. Aim for a sequential approach. • Make a code letter Holden might have written to Phoebe. Include a key to your code, a letter written in code, and a translated letter. You may not use a computer font as your code. • Stage and record a debate over an issue in the book • Create a Venn Diagram that c/c 1960's to today	<u>Visual/Spatial</u> • Sketch a colorful rendition of a character in the book. • Write a script and design 4 costumes for a <i>Catcher</i> fashion show. • Create a series of 4 greeting cards, each for a different occasion. Use quotes from the book in each card. In 2 of the cards, use the book as the source for your artistic expression. • Sketch/Draw the carousel scene from the end of the book.	<u>Bodily/Kinesthetic</u> • Perform a monologue as a character in the book. • Videotape your group reenacting a scene from the book • Videotape yourself as a newsreporter telling the local news of the time • Tape a radio broadcast on a national network, talking about depression
<u>Verbal/Linguistic</u> • Write a letter from Holden trying to get his school to allow him to return for the next semester. • Write a letter from Holden to Phoebe or to Jane Gallagher • Write 3-5 poems for different characters	<u>Interpersonal</u> • Interview a character on video • Work with a partner to develop a packet of four word games based on themes from the book. One word game may be a crossword puzzle. • Video or Audio tape an interview with a person who lived during the 1960's	<u>Intrapersonal</u> • Write a journal Holden might have kept • Write a reflection on depression and its effects on society	<u>Naturalist</u> • Student suggestions